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TITLE: IMAGE PICKUP DEVICE

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ABSTRACT:

PROBLEM TO BE SOLVED: To provide a device with which the image without camera shake can be provided through a simple means without lowering the picture quality of a still picture by providing a photographic optical system, control means, storage means and image compositing means.

SOLUTION: In order to provide the image of optimum exposure, based on the focal distance information, diaphragm information and lightness information of a photographic optical means 1, a storage control means 4 sets the storage time of an image pickup means 2 optimum for photographing images a plurality of times without shake. This image pickup means 2 performs

photographing a
plurality of times within the set storage time, records and holds the images in
a memory means 5. A shake detecting means 6 detects the shake of a plurality
of images recorded and held in the memory means 5.
Besides, a shake correcting
means 7 shifts the positions of a plurality of images corresponding to the
shake information of the shake detecting means 6, overlaped these images and
composites them into optimum image.

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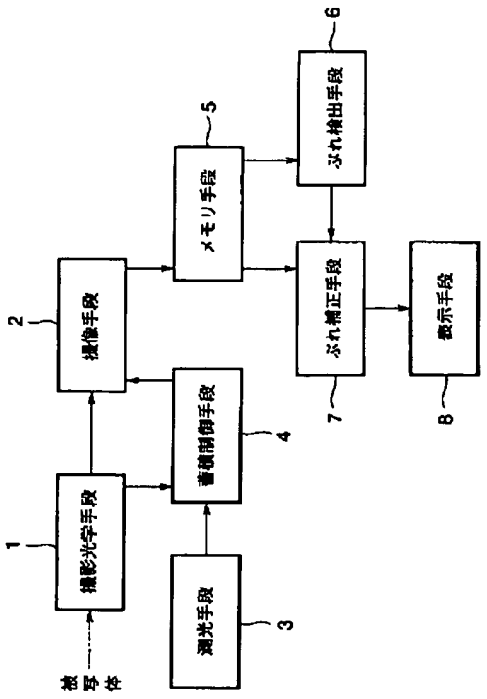
(54)【発明の名称】　撮像装置

(57)【要約】

【課題】　静止画の画質を低下させずに簡単な手段によってぶれのない画像が得られる撮像装置を提供する。

【解決手段】　被写体を撮像手段２に結像させる撮影光学手段１と、この被写体を電気信号に変換する撮像手段２と、被写体の明るさを測定する測光手段３と、この測光手段３の明るさ情報と撮影光学手段１の焦点距離情報、絞り情報とから上記撮像手段２の信号蓄積時間を設定する蓄積制御手段４と、上記撮像手段２の電気的画像を記録するメモリ手段５と、このメモリ手段５の連写された複数の画像よりぶれを検出するぶれ検出手段６と、このぶれ検出手段６にて検出されたぶれ情報に基づいてぶれを補正するぶれ補正手段７と、補正された画像を表示する表示手段８とから撮像装置を構成する。



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【特許請求の範囲】
【請求項1】　蓄積型画像センサ上に被写体像を導く撮影光学系と、
被写体輝度情報と撮影光学系の焦点距離情報とに基づいて、撮影時にぶれが無視し得る前記蓄積型画像センサの蓄積時間と、この蓄積時間の撮影によって適正露光量を得るための連続撮影の回数とを設定する制御手段と、
前記得られた複数の画像データを記憶する記憶手段と、
前記記憶手段に記憶された画像データにつき、相互のずれを補正した後に1枚の適正露光の画像に合成する画像合成手段と、を具備することを特徴とする撮像装置。
【請求項2】　蓄積型画像センサ上に被写体像を導く撮影光学系と、
被写体輝度情報と撮影光学系の焦点距離情報とに基づいて、撮影時にぶれが無視し得る前記蓄積型画像センサの蓄積時間と、この蓄積時間の撮影によって適正露光量を得るための連続撮影の回数とを設定する制御手段と、
前記連続撮影の最中に生じたぶれに関するぶれ情報を検知するぶれセンサと、
前記得られた複数の画像データを記憶する記憶手段と、
前記記憶手段に記憶された画像データと前記ぶれ情報とに基づいて、相互の画像ずれを補正した後に1枚の適正露光の画像に合成する画像合成手段と、を具備することを特徴とする撮像装置。
【請求項3】　蓄積型画像センサ上に被写体像を導く撮影光学系と、
被写体輝度情報と撮影光学系の焦点距離情報とに基づいて、撮影時にぶれが無視し得る前記蓄積型画像センサの蓄積時間と、この蓄積時間の撮影によって適正露光量を得るための連続撮影の回数とを設定する制御手段と、
前記得られた複数の画像データを記憶する記憶手段と、
前記記憶手段に記憶された画像データに基づき、相互の画像ずれを補正した後に1枚の適正露光の画像に合成する画像合成手段と、
前記合成画像を表示する表示手段と、を具備することを特徴とする撮像装置。
【発明の詳細な説明】
【0001】
【発明の属する技術分野】静止画を撮影する撮像装置に関し、例えばこの装置のぶれ補正技術に関する。
【0002】
【従来の技術】静止画を撮影する撮像装置の中でも特に電子カメラでは、画像が電気的に記録できるために、ぶれ防止方法も銀塩写真とは異なった種々の方式が提案されている。例えば、特開平2－172366号公報では、連続して複数画像の撮影を行い、ぶれの少ない画像のみを記録する方式の電子スチルカメラが開示されている。
【0003】また、特開平5－268523号公報では、ぶれ量に応じて撮像素子の蓄積時間を設定し、光量

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不足の補正をゲインの調整によって行う方式のビデオカメラが開示されている。
【0004】
【発明が解決しようとする課題】しかしながら、特開平2－172366号公報の方式の電子スチルカメラによって連続して複数枚の画像を撮影しても、蓄積時間が長い場合や焦点距離が長い場合には必ずしもぶれが無くなることはなく、シャッタチャンスを逃した画像ばかりが記録されることにもなってしまう場合も起こり得る。
【0005】また、特開平5－268523号公報の方式のビデオカメラでは、ぶれに応じて蓄積時間を設定してゲインで補正しようとするにしても、元のS／Nが悪いため補正された画像は更に劣悪なものになってしまうという不具合もあった。
【0006】このように、従来から上述の不具合を克服しなければならないという課題があり、良質の画像を得ることのできる撮像装置が待望されていた。そこで、本発明の目的は、静止画の画質を低下させずに簡単な手段によってぶれのない画像が得られる撮像装置を提供することにある。
【0007】
【課題を解決するための手段】上記の課題を解決し目的を達成するために本発明の撮像装置は、実質的にぶれのない蓄積時間で複数回連続的に撮影して、撮影ごとのぶれを補正して「重ね合わせる」ことで、ぶれのない適切な露出の画像を得ることのできる撮像装置を提供する。詳しくは、低輝度条件においては手ぶれしないような露光時間で連写して、複数画像相互のずれを補正してから露光不足の画像群を合成する。これを達成するために、本発明の撮像装置を次のように構成する。
【0008】［1］　蓄積型画像センサ上に被写体像を導く撮影光学系と、被写体輝度情報と撮影光学系の焦点距離情報とに基づいて、撮影時にぶれが無視し得る前記蓄積型画像センサの蓄積時間と、この蓄積時間の撮影によって適正露光量を得るための連続撮影の回数とを設定する制御手段と、この得られた複数の画像データを記憶する記憶手段と、前記記憶手段に記憶された画像データにつき、相互のずれを補正した後に1枚の適正露光の画像に合成する画像合成手段とを具備する撮像装置を提供する。
【0009】［2］　蓄積型画像センサ上に被写体像を導く撮影光学系と、被写体輝度情報と撮影光学系の焦点距離情報とに基づいて、撮影時にぶれが無視し得る前記蓄積型画像センサの蓄積時間と、この蓄積時間の撮影によって適正露光量を得るための連続撮影の回数とを設定する制御手段と、この連続撮影の最中に生じたぶれに関するぶれ情報を検知するぶれセンサと、この得られた複数の画像データを記憶する記憶手段と、前記記憶手段に記憶された画像データと前記ぶれ情報とに基づいて、相互の画像ずれを補正した後に1枚の適正露光の画像に合

成する画像合成手段とを具備する撮像装置を提供する。

【００１０】［３］　蓄積型画像センサ上に被写体像を導く撮影光学系と、被写体輝度情報と撮影光学系の焦点距離情報とに基づいて、撮影時にぶれが無視し得る前記蓄積型画像センサの蓄積時間と、この蓄積時間の撮影によって適正露光量を得るための連続撮影の回数とを設定する制御手段と、この得られた複数の画像データを記憶する記憶手段と、前記記憶手段に記憶された画像データに基づき、相互の画像ずれを補正した後に１枚の適正露光の画像に合成する画像合成手段と、この合成画像を表示する表示手段とを具備する撮像装置を提供する。

【００１１】

【発明の実施の形態】本発明の基本的な部分を第１の実施形態として以下に示し、更に具体的な形態を第２の実施形態として示す。

（第１実施形態）図１に、本発明の撮像装置について概略的な構成をブロック図で示している。

【００１２】本発明に係わる画像のぶれ検出は、従来技術（例えば、特開平１－１０９９７０号公報）に開示されているような「画像間のぶれ」を画像の複数箇所にて検出する方式にて行うものとする。

【００１３】この撮像装置は図示するように次のような各手段によって構成されている。被写体を撮像手段２に結像させる撮影光学手段１と、この被写体を電気信号に変換する撮像手段２と、被写体の明るさを測定する測光手段３と、この測光手段３の明るさ情報と撮影光学手段１の焦点距離情報、絞り情報とから上記撮像手段２の信号蓄積時間を設定する蓄積制御手段４と、上記撮像手段２の電気的画像を記録するメモリ手段５と、このメモリ手段５の連写された複数の画像よりぶれを検出するぶれ検出手段６と、このぶれ検出手段６にて検出されたぶれ情報に基づいてぶれを補正するぶれ補正手段７と、補正された画像を表示する表示手段８とから撮像装置は主に構成されている。

【００１４】（作用効果１）上述のような構成において、各手段はそれぞれ次のような作用を奏する。蓄積制御手段４は、最適な露出の画像を得るために撮影光学手段１の焦点距離情報と絞り情報と明るさ情報を元に複数回のぶれない画像の撮影を行うための最適な撮像手段２の蓄積時間を設定する。この撮像手段２は、設定された蓄積時間にて複数回の撮影を行い、画像をメモリ手段５に記録保持する。

【００１５】ぶれ検出手段６は、メモリ手段５中に記録保持された複数画像の画像間のぶれを検出する。また、ぶれ補正手段７は、ぶれ検出手段６のぶれ情報に応じて複数画像の位置をずらし重ね合わせ、即ち、加算処理し、最適な画像に合成する。

【００１６】従って、蓄積時間が長い場合の撮影でもぶれのない適正露出の画像を提供できる。図２には、「ぶれ処理」に係わる処理手順をフローチャートで示している。

【００１７】このルーチンは、本発明の特徴であるぶれ処理のメインルーチンとして、所定の制御手段で実行され、後述するサブルーチンをコールしている。当シーケンスを開始すると（Ｓ１０）、まず、「明るさ情報」と「絞り情報」より、用いられている撮像素子にとって最適な蓄積時間ｔａを設定する。

【００１８】「撮影焦点距離情報」より、ぶれの少ない蓄積時間ｔ（ｆ）を設定する（Ｓ１２）。最適な蓄積時間ｔａと蓄積時間ｔ（ｆ）の大小比較を行う（Ｓ１３）。ここで、ｔａ＜ｔ（ｆ）である場合は、実際の蓄積時間ｔｇをｔａに設定すると共に、撮影回数ｉｃを１に設定する（Ｓ１４）。その後、撮影動作を行ってステップＳ２０へ進む（Ｓ４２）。

【００１９】一方、上記ステップＳ１３でｔａ＜ｔ（ｆ）ではない場合は、サブルーチン「蓄積時間連写回数設定」のコールによって、蓄積時間ｔｇと連続撮影回数ｉｃの設定を行う（Ｓ１４）。

【００２０】変数ｉに１を初期設定する（Ｓ１５）。その後、撮影動作を行う（Ｓ１６）。変数ｉと連写回数ｉｃの大小判定を行う（Ｓ１７）。まだ、ｉ＝ｉｃでない場合は、この変数ｉをｉ＋１にカウントアップしてステップＳ１６へ戻る。

【００２１】一方、ｉ＝ｉｃの場合には、ｉｃ回「連写」された撮影画像間のぶれ（即ち、方向とぶれ量）を検出する（Ｓ１８）。検出された各画像ごとのぶれを補正して重ね合わす（Ｓ１９）。

【００２２】得られた撮影画像を表示手段に出力表示する（Ｓ２０）。そして、以上の一連のシーケンスを終了する（Ｓ２１）。また、図３のフローチャートには、上述の「蓄積時間と連写回数設定」に係わるサブルーチンを示している。

【００２３】このサブルーチンがコールされると、次のような設定シーケンスを開始する（Ｓ１４）。ｔａ／ｔ（ｆ）を行い、小数点以下を切り捨てた値を変数ｂに設定する（但し、変数ｂは整数とする）（Ｓ１４１）。

【００２４】実際の蓄積時間ｔｇに、｛ｔａ／（ｂ＋１）｝＋αを設定する（但し、αは所定の短い時間，例えば０でもよい）（Ｓ１４２）。連写回数ｉｃに、ｂ＋１を設定する（なお、ｉｃ＝１では、連写は行われない）（Ｓ１４３）。

【００２５】本シーケンスから前述のメインルーチンにリターンする（Ｓ１４４）。ここで、連写した複数の画像に基づいて、正しい画像に補正する手法について説明する。

【００２６】図４（ａ）に示すぶれ検出されたＡ～Ｃの３枚の連写画像を、図４（ｂ）に示すように重ね合わせて合成して得られた１つの合成画像を生成する。詳しくは、図４（ａ）に示すように、画面の複数のブロック点で画像間ごとの一致性を判断して、Ｘ，Ｙの２軸方向に

関する「ずれ量」を検出する。

【００２７】このずれ量を所望により画像Ａを基準にして画像Ｂおよび画像Ｃをずれを補完する方向に「シフト」させる。すなわち、加算処理させて図４（ｂ）に示す合成画像を得る。

【００２８】（作用効果１’）以上の本実施形態で説明したように、新しいセンサを付加することなく長焦点や長秒時などでぶれが発生する場合であっても、実質的にぶれのない蓄積時間で連続撮影を行って得た撮影画像ごとのぶれを補正し、合成処理することにより、ぶれのない画像を提供することができる。

【００２９】したがって、ぶれ検出は画像センサにて行わなくても、複数に分割された測光センサやＡＦセンサを用いてもよいし、角速度センサ、角加速度センサ、速度センサまたは加速度センサ等のような、いわゆる「ぶれセンサ」を用いてもよい。

【００３０】次に示す図５のブロック図には、本発明の撮像装置に圧電形の角加速度センサ（以下、圧電センサと略称する）を用いた場合の構成を例示している。この例では、前述の図１に示した各手段に、圧電センサ９を加えて構成されている。すなわち、撮影光学手段１と撮像手段２と測光手段３と蓄積制御手段４とメモリ手段５とぶれ検出手段６とぶれ補正手段７と表示手段８と、この圧電センサ９から撮像装置が主に構成されている。

【００３１】ただし、ぶれ検出手段６は、メモリ手段５からの情報ではなく、この圧電センサ９からの情報に基づいて画像のぶれを検出し、この検出されたぶれ情報に基づいてぶれ補正手段７がこれを補正する。

【００３２】また、測光手段は、撮像手段の信号を用いて行ってもよい。

（作用効果１”）ぶれを直接に測定可能なセンサを用いた場合は、センサからのぶれ情報より直接画像間のぶれ補正が可能となるので、さらなる高速化処理も可能となる。

【００３３】以上のように本実施形態では、実質的にぶれない蓄積時間で適正露出になるまで複数連写することにより、実質的にぶれのない複数の画像を得ることが可能となり、画質のＳ／Ｎは撮影ごとのぶれを補正して重ね合わせ処理することで向上し、その結果、ぶれのない適正露出の画像を提供できる撮像装置を実現できる。

【００３４】（第２実施形態）続いて、本発明に係わる第２の実施形態として、例えば電子カメラを例にその実際について説明する。なお、本実施形態においては、ぶれは撮影画像間の相関にて検出する方式にて行う。また、測光や測距（以下、ＡＦと略称する）も画像センサを兼用して用いている。

【００３５】図６に示すブロック図は、電子カメラの主要部の構成を例示している。電子カメラを統括的に制御する制御回路のＣＰＵ１１には、次のような各構成要素が接続されている。すなわち、被写体像を撮像して電気

信号に変換する撮像素子としてのＣＣＤ１２と、所定の増幅処理およびＡ／Ｄ変換処理を行う処理回路１３と、生成されたディジタル信号を一時的に記録するＲＡＭ１４と、ズーミングのためのズーム光学系１５と、自動測距のためのＡＦ光学系１６と、上記ズーム光学系を駆動するズームモータ１７と、上記ＡＦ光学系を駆動するＡＦモータ１８と、得られた画像を表示出力するＬＣＤ１９と、制御回路のＣＰＵ外部に設けられた例えばＩＣカード等の外部メモリ２０と、レリーズＳＷ（即ち、1st,2nd）２１，２２、ズームＳＷ（即ち、Up，Down）２３，２４および、メインＳＷ２５等の操作スイッチ群から、この電子カメラの主要部は構成されている。

【００３６】（作用効果２）上述の構成の電子カメラにおいて、ユーザによるメインＳＷ２５のＯＮ操作によって、ＡＦ系等が駆動してＬＣＤ１９にＣＣＤ１２で撮影された画像が処理回路にて最適化（例えば、ＡＧＣ(Auto Gain Control)、蓄積時間制御等）され動画として表示される。レリーズＳＷの操作により、静止画撮影動作に入り、ズーム値と「明るさ情報」と「絞り情報」にてぶれのない蓄積時間と連続撮影回数をＣＰＵ１１が設定して撮影が行われる。複数の撮影画像はいったんＲＡＭ１４に蓄積記憶され、ＣＰＵ１１はそれらの画像間のずれの検出、ずれ補正および、画像の合成を前述の手法で行い、その合成されて得られた画像をＬＣＤ１９に表示出力すると共に、外部メモリ２０に記録保存する。

【００３７】したがって、ぶれやすい長焦点の撮影であっても、蓄積時間が長い場合の撮影でもぶれのない適正露出の画像を提供できる。なお、ＣＰＵ１１にはＲＩＳＣ(Reduced Instruction Set Computer)を用いることにより処理時間がいっそう短くすることができる。

【００３８】図７には、「撮影」に係わる一連の処理シーケンスをフローチャートで示している。このルーチンは、本発明に係わる電子カメラのカメラシーケンスであり、本発明の特徴である「ぶれ処理」は、このメインルーチン中でコールする後述のサブルーチンで実行される。

【００３９】撮影を開始（Ｓ１０１）に伴い、まず、カメラはメインＳＷの状態判定を行う（Ｓ１０２）。もし、メインＳＷがＯＦＦの場合は、本シーケンスを強制終了するためステップＳ１２４に分岐して当ルーチンを終了する。

【００４０】一方、メインＳＷがＯＮ操作された場合には、以下の一連の処理ステップが行われる。イニシャライズ（例えば、レンズ位置等の初期設定）を行う（Ｓ１０３）。

【００４１】ファインダの代わりとして動画をＬＣＤ表示すると共に、ＡＦ（例えば、「コントラストＡＦ」または「山登りＡＦ」等）、表示用の自動露出（以下、ＡＥと略称する）を開始する（Ｓ１０４）。

【００４２】ここで再度、メインＳＷの状態判定を行う

（Ｓ１０５）。ここで、メインＳＷがＯＦＦの場合は、本シーケンスを強制終了するためステップＳ１２４に分岐して当ルーチンを終了する。

【００４３】一方、メインＳＷがＯＮの場合には、ズームＳＷ（即ち、ズームｕｐ又はズームｄｏｗｎ）の判定を行い（Ｓ１０６，Ｓ１２１）、もし、ズームｕｐの場合には、ズームを長焦点側に所定量駆動する（Ｓ１２２）。一方、ズームｄｏｗｎの場合には、ズームを短焦点側に所定量駆動する（Ｓ１２３）。そして、駆動終了後はステップＳ１０５へ戻る。

【００４４】上記ステップＳ１０６において、何等のズーム操作がされていない場合には、1st. レリーズの状態判定を行う（Ｓ１０７）。ここでもし、1st. レリーズがＯＦＦの場合はステップＳ１０５へ戻る。

【００４５】一方、1st. レリーズがＯＮの場合には、後述するサブルーチン「露出設定」をコールして静止画撮影露出の設定を行う（Ｓ１０８）。そして、ＡＦロックを行う（Ｓ１０９）。

【００４６】再度、1st. レリーズの状態判定を行い（Ｓ１１１）、もし、1st. レリーズがＯＦＦの場合はステップＳ１１０５へ戻る。一方、1st. レリーズＯＮの場合には引き続き、2nd. レリーズの状態判定を行う（Ｓ１１１）。2nd. レリーズがＯＦＦの場合はステップＳ１１０へ戻る。一方、2nd. レリーズがＯＮの場合には、変数ｉに1を設定する（Ｓ１１２）。

【００４７】動画の表示をロックする。すなわち、画面を撮影直前の画面のまま表示し続ける（Ｓ１１３）。そして、後述するサブルーチン「撮像処理」をコールして撮像を行いステップＳ１０５へ戻る（Ｓ１１４）。

【００４８】また、図8に前述のサブルーチン「露出設定」に係わる処理シーケンスをフローチャートで示す。当ルーチンがコールされると、この露出設定のシーケンスを開始する（Ｓ１０８）。

【００４９】まず、現在のズーム値ｆを読み込む（Ｓ８１）。レンズ情報（例えば、撮影絞り情報等）と明るさ情報による最適蓄積時間ｔａの設定を行う（Ｓ８２）。

【００５０】焦点距離ｆより、ぶれ防止秒時ｔｐの設定を行う（Ｓ８３）。最適蓄積時間ｔａとぶれ防止秒時ｔｐとの大小比較を行う（Ｓ８４）。もし、ｔａ＜ｔｐの場合には、実際の蓄積時間ｔｇをｔａに設定し、連写による撮影回数ｉｃを1に設定する（Ｓ８８）。

【００５１】一方、ｔａ＜ｔｐでない場合は、演算ｔａ／ｔｐを行い、小数点以下の切り捨てた値を変数ｂに設定する（但し、変数ｂは整数とする）（Ｓ８５）。実際の蓄積時間ｔｇに｛ｔａ／（ｂ＋1）｝＋αを設定する（但し、定数αは所定の短い時間又は、0でもよい）（Ｓ８６）。

【００５２】連写回数ｉｃにｂ＋1を設定する（但し、ｉｃ＝1とは、連写は行われないことを意味する）（Ｓ８７）。そして、以上の一連の処理を終了してメインルーチンにリターンする（Ｓ８９）。

【００５３】また、図9のフローチャートには、前述のサブルーチン、すなわち、ぶれのない秒時設定に係わる「ｆ値よりぶれ防止秒時設定」の処理シーケンスを示す。コールされて、このぶれのない秒時設定のシーケンスを開始すると（Ｓ８３）、次のように、焦点距離ｆの値に応じてぶれ防止秒時ｔｐを設定する。詳しくは、まず、ｆｗとｆとの大小比較を行い（Ｓ８３１）、もし、ｆｗ＞ｆの場合は、演算ｔｐ＝1／ｆｗを行い（Ｓ８３４）、ステップＳ８３６に進んでリターンする。一方、ｆｗ＞ｆではない場合は、ｆｔとｆとの大小比較を行い（Ｓ８３２）、もし、ｆ＞ｆｔの場合は、演算ｔｐ＝1／（２ｆ）を行う（Ｓ８３５）。

【００５４】一方、ｆ＞ｆｔではない場合には、演算ｔｐ＝1／ｆを行う（Ｓ８３３）。そして、一連の処理ステップを終了してコールしたメインルーチンにリターンする（Ｓ８３６）。

【００５５】なお、上述の各変数の値は次のように設定してもよい。

ｆｗ：　短焦点側の所定の値、例えば実測値ｆ＝６０㎜

ｆｔ：　長焦点側の所定の値、例えば実測値ｆ＝１５０㎜

また、長焦点側は所定時間短い方にシフトしてもよい。例えば、ｆ＞ｆｔの場合には、ｔｐ＝1／（ｆ＋ｄ）と演算してもよい。但し、ｄは所定値とする。

【００５６】ここで、図１０には、ぶれない秒時設定の焦点距離ｆと1／ｔｐの関係をグラフで示している。このグラフが示す傾向からもわかるように、例えば、短焦点側では、ｆｗのところから焦点距離が短くなっても、時間ｔｐは一定になる。

【００５７】また逆に、長焦点側ｆｔより長くなると、時間ｔｐはさらに短くなることがわかる。図１１に示すフローチャートには、前述のサブルーチン「撮像処理」が例示されている。当ルーチンがコールされると、撮像処理が開始され（Ｓ１１４）、まず、センサの信号リセットを行う（Ｓ４０２）。

【００５８】蓄積（即ち、蓄積時間ｔｇの間で撮像）を行う（Ｓ４０３）。信号の読出し（即ち、予測される蓄積信号に対してＡＧＣ(Auto Gain Control) 処理を行い、Ａ／Ｄ変換）を行う（Ｓ４０４）。

【００５９】ディジタル信号をＲＡＭに記録保持する（Ｓ４０５）。連写回数ｉと撮影回数ｉｃとの大小判定を行う（Ｓ４０６）。もし、ｉ＝ｉｃでない場合は、ｉにｉ＋1を設定（即ち、ｉを1つインクリメント）して前述のステップＳ４０２へ戻る（Ｓ４０７）。

【００６０】一方、ｉ＝ｉｃの場合には、続いてｉｃの値の大きさの判定を行う（Ｓ４１１）。もし、ｉｃ＝1の場合は、ステップＳ４１５へ進む。一方、ｉｃ＝1でない場合には次の処理ステップ（Ｓ４１２～Ｓ４１４）を行う。すなわち、画像間のぶれを画像間の相関より求

める（なおこの詳細は、特開平１－１０９９７０号公報に開示されているので説明は省略する）（Ｓ４１２）。

【００６１】画像ごとのずれを、例えばその１枚目の画像（即ち、連写した最初の画像Ａ）を基準にして所定量だけシフトする（Ｓ４１３）。シフトさせた画像を加算合成する（Ｓ４１４）。

【００６２】外部メモリに記録する（Ｓ４１５）。撮影した画像を所定時間だけ表示出力を行う（Ｓ４１６）。ファインダの代わりとして、動画のＬＣＤ表示に戻る（Ｓ４１７）。

【００６３】そして、以上の一連の処理を終了して、コールしたメインルーチンにリターンする（Ｓ４１８）。（作用効果２'）本実施形態で説明したように、上述の手法によれば、長焦点や長秒時などぶれが発生する場合でも、実質的にぶれがなくできる限りＳ／Ｎの良好な複数の画像を安定して得ることができる。また、撮影ごとのぶれを補正して重ね合わせ処理することで画質のＳ／Ｎは更に向上し、このぶれのない適正露出の画像をその場で表示出力もできる。

【００６４】（変形例２）なお、前述のぶれ検出は、画像センサにて行わなくても複数に分割された測光センサやＡＦセンサを用いてもよいし、角速度，角加速度，速度，加速度センサ等のブレセンサを用いてもよい。

【００６５】測光手段は撮像手段の信号を用いてもよい。ＡＦは専用の構成を設けてもよい。また、合成は読出し時にぶれを補正して加算処理を行うとメモリの節約が可能になる。

【００６６】なお、カメラにはぶれを補正するモードと、ぶれを補正しないモードとの両方を設けた方が好適な実施形態である。なぜならば、撮影のうまいユーザはぶれが少ないので、あまり連写しないか、連写の必要がない故である。

【００６７】また、実際の蓄積時間をぶれをリアルタイムで測定可能なセンサで測定し、所定以上のぶれが発生した時点で、撮影を中止して次の撮影に移るようにしてもよい。

【００６８】（その他の変形例）明細書中で記述した各手段は、具体的には次のような対応関係にあってもよい。例えば、撮影光学手段１はズーム光学系１５、ＡＦ光学系１６または測距手段３０に対応する。撮像手段２はＣＣＤ１２に対応する。測光手段３は図示しないＡＥ機構に対応する。蓄積制御手段４はＣＰＵを含む制御回路１１に対応する。メモリ手段５は外部メモリ２０またはＲＡＭ１４に対応する。ぶれ検出手段６は画像センサ、測光センサ、ＡＦセンサまたは各種の速度センサに対応する。ぶれ補正手段７は「ぶれ処理」等のプログラムに対応する。表示手段８はＬＣＤ１９に対応する。このほかにも、本発明の要旨を逸脱しない範囲で種々の変形実施が可能である。

【００６９】以上、複数の実施形態に基づいて説明したが、本明細書中には以下の発明が含まれている。

［１］　蓄積型画像センサ上に被写体像を導く撮影光学系と、被写体輝度情報と撮影光学系の焦点距離情報とに基づいて、撮影時にぶれが無視し得る前記蓄積型画像センサの蓄積時間と、この蓄積時間の撮影によって適正露光量を得るための連続撮影の回数とを設定する制御手段と、前記得られた複数の画像データを記憶する記憶手段と、前記記憶手段に記憶された画像データにつき、相互のずれを補正した後に１枚の適正露光の画像に合成する画像合成手段と、を具備することを特徴とする撮像装置。

【００７０】［２］　蓄積型画像センサ上に被写体像を導く撮影光学系と、被写体輝度情報と撮影光学系の焦点距離情報とに基づいて、撮影時にぶれが無視し得る前記蓄積型画像センサの蓄積時間と、この蓄積時間の撮影によって適正露光量を得るための連続撮影の回数とを設定する制御手段と、前記連続撮影の最中に生じたぶれに関するぶれ情報を検知するぶれセンサと、前記得られた複数の画像データを記憶する記憶手段と、前記記憶手段に記憶された画像データと前記ぶれ情報とに基づいて、相互の画像ずれを補正した後に１枚の適正露光の画像に合成する画像合成手段と、を具備することを特徴とする撮像装置。

【００７１】［３］　蓄積型画像センサ上に被写体像を導く撮影光学系と、被写体輝度情報と撮影光学系の焦点距離情報とに基づいて、撮影時にぶれが無視し得る前記蓄積型画像センサの蓄積時間と、この蓄積時間の撮影によって適正露光量を得るための連続撮影の回数とを設定する制御手段と、前記得られた複数の画像データを記憶する記憶手段と、前記記憶手段に記憶された画像データに基づき、相互の画像ずれを補正した後に１枚の適正露光の画像に合成する画像合成手段と、前記合成画像を表示する表示手段と、を具備することを特徴とする撮像装置。

【００７２】（１）　画像を電気信号に変換する撮像手段と、撮像手段のぶれが少ない蓄積時間と連続撮影する撮影回数とを設定する蓄積制御回路と、連続撮影された画像間のぶれを検出する検出手段と、連続撮影された画像間のぶれを補正して重ね合わせる補正手段と、を具備したことを特徴とする撮像装置。

【００７３】作用１：　撮像手段は画像を電気信号に変換し、蓄積制御手段は撮像手段のぶれの少なくなる蓄積時間と連続して撮影する撮影回数とを設定し撮影を行い、ぶれ検出手段は連続して撮影された画像間のぶれを検出する。ぶれ補正手段は連続して撮影された画像間のぶれを補正して重ね合わせ処理を行い目的の画像を得る。

【００７４】効果１：　ぶれない蓄積時間にて適正露出になるまで複数連写することで、実質的にぶれのない複数の画像を得ることが可能で、画質のＳ／Ｎは撮影ごと

のぶれを補正して重ね合わせ処理することで向上し、この結果、ぶれのない適正露出の画像を提供できる。

【0075】（2）　被写体を撮像手段に結像させる撮影光学系と、画像を電気信号に変換する撮像手段と、撮影に適切な撮像手段の画像蓄積時間を算出する測光手段と、撮影光学系の焦点距離情報と、前記測光手段により決定される適切な蓄積時間とに基づいて撮影時の前記撮像手段の蓄積時間と、連続撮影する回数とを設定する蓄積制御回路と、連続撮影された画像間のぶれを検出する検出手段と、連続撮影された画像間のぶれを補正して重ね合わせる補正手段と、を具備したことを特徴とする撮像装置。

【0076】作用2：　撮影光学手段は被写体を撮像手段に結像させ、撮像手段は画像を電気信号に変換する。測光手段は撮影に適切な撮像手段の画像蓄積時間を算出し、蓄積制御手段は撮影光学手段の撮影焦点距離情報と測光手段にて決定される適切な蓄積撮像時間より実際の撮影の撮像手段の画像蓄積時間と連続して撮影する撮影回数とを設定し撮影制御する。ぶれ検出手段は連続して撮影された画像間のぶれを検出し、ぶれ補正手段は連続して撮影された画像間のぶれを補正して重ね合わせ処理を行い目的の画像を得る。

【0077】効果2：　ぶれない蓄積時間を適正露出の時間と撮影焦点距離より設定し、適正露出になるまで複数連写することにより、実質的にぶれがなくできる限りS／Nの良好な複数の画像を得ることができ、更に画質のS／Nは撮影ごとのぶれを補正して重ね合わせ処理することで向上し、この結果、ぶれのない適正露出の画像を提供できる。

【0078】（3）　被写体を撮像手段に結像させる撮影光学系と、画像を電気信号に変換する撮像手段と、撮影された画像データを記憶するメモリ手段と、撮影に適切な撮像手段の画像蓄積時間を算出する測光手段と、撮影光学系の焦点距離情報と、前記測光手段により決定される適切な蓄積時間とに基づいて撮影時の前記撮像手段の蓄積時間と、連続撮影する回数とを設定する蓄積制御回路と、連続撮影された画像間のぶれを検出する検出手段と、連続撮影された画像間のぶれを補正して重ね合わせる補正手段と、重ね合わされた画像を表示する画像表示手段と、を具備したことを特徴とする撮像装置。

【0079】作用3：　撮影光学手段は被写体を撮像手段に結像させ、撮像手段は画像を電気信号に変換し、メモリ手段は撮影された画像を一時記録する。測光手段は撮影に適切な撮像手段の画像蓄積時間を算出し、蓄積制御手段は撮影光学手段の撮影焦点距離情報と測光手段にて決定される適切な蓄積撮像時間より実際の撮影の撮像手段の画像蓄積時間と連続して撮影する撮影回数とを設定し撮影制御する。ぶれ検出手段は連続して撮影された画像間のぶれを検出し、ぶれ補正手段は連続して撮影された画像間のぶれを補正して重ね合わせ処理を行い、画像表示手段は補正量に応じて重ね合わされた目的の画像を表示出力する。

【0080】効果3：　ぶれない蓄積時間を適正露出の時間と撮影焦点距離より設定し、適正露出になるまで複数連写し、メモリ手段に蓄積することで、実質的にぶれがなくできる限りS／Nの良好な複数の画像を安定して得ることができ、更に画質のS／Nはメモリ手段に記録された画像から取り出し、撮影ごとのぶれを補正して重ね合わせ処理することで向上し、この結果、ぶれのない適正露出の画像をその場で表示提供できる。

【0081】（4）　前記測光手段は、前記撮像手段の出力信号に基づいて出力信号を発生することを特徴とする（2）または（3）に記載の撮像装置。

（5）　前記ぶれ検出手段は、連続撮影した画像間の相関に基づいてぶれを検出することを特徴とする（1），（2），（3）または（4）に記載の撮像装置。

【0082】（6）　前記ぶれ検出手段は、圧電型センサによって画像間のぶれを検出することを特徴とする（1），（2），（3）または（4）に記載の撮像装置。

（7）　撮影光学系と、蓄積時間が可変の撮像手段と、適正露光を与える適正蓄積時間を設定する演算手段と、撮影時のぶれが無視し得る蓄積時間と、その蓄積時間と適正蓄積時間との関係に応じて決定される連続撮影回数とを設定する露光制御手段と、連続撮影された画像相互のずれを補正した後に加算する画像合成手段と、を具備することを特徴とする撮像装置。

【0083】（8）　被写体を結像させる撮影光学手段と、当該被写体の結像を電気信号に変換する撮像手段と、当該被写体の明るさを測定する測光手段と、前記測光手段の「明るさ情報」と前記撮影光学手段の「焦点距離情報」、「絞り情報」とから前記撮像手段の信号蓄積時間を設定する蓄積制御手段と、前記撮像手段の電気的画像を記録するメモリ手段と、前記メモリ手段の連写された複数の画像よりぶれを検出するぶれ検出手段と、前記ぶれ検出手段にて検出された「ぶれ情報」に基づいてぶれを補正するぶれ補正手段と、補正された画像を表示出力する表示手段と、を具備することを特徴とする撮像装置。

【0084】

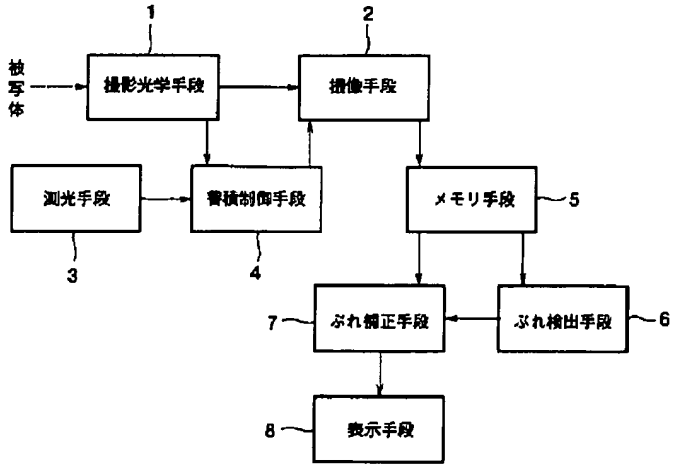
【発明の効果】このように本発明によれば、新しいセンサを特に付加することがなくとも、簡単な構成で長焦点や長秒時などに起因してぶれが発生する場合でも、実質的にぶれのない蓄積時間で連続撮影を行い撮影画像ごとのぶれを補正し、更に重ね合わせによる合成処理をすることによって、静止画の画質を低下させずに簡単にぶれのない画像の得られる電子カメラ等の撮像装置を提供することができる。

【図面の簡単な説明】

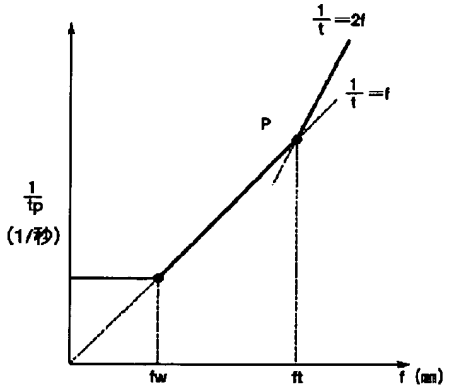
【図1】図1は、本発明に係わる第1実施形態の撮像装

置についての構成を概略的に示すブロック図。
【図2】図2は、「ぶれ処理」に係わるメインルーチンを示すフローチャート。
【図3】図3は、「蓄積時間と連写回数設定」に係わるサブルーチンを示すフローチャート。
【図4】　ぶれ検出の様子を模式的に示し、（a）は、画面の複数のブロック点で画像間ごとの一致性を判断して、2軸方向にズレ量を検出する様子を示す概念図、（b）は、ずれ量をシフトさせて加算処理する様子を示す概念図。
【図5】図5は、本発明の撮像装置に圧電形の角加速度センサを用いた場合の構成を示めす構成ブロック図。
【図6】図6は、本発明に係わる第2実施形態の撮像装置についての構成を示すブロック図。
【図7】図7は、「撮影」に係わる処理シーケンスを示すフローチャート。
【図8】図8は、「露出設定」に係わる処理シーケンスを示すフローチャート。
【図9】図9は、ぶれのない秒時設定に係わる「f値よりぶれ防止秒時設定」の処理シーケンスを示すフローチャート。
【図10】図10は、ぶれない秒時設定の焦点距離fと1／tpの関係を示すグラフ。
【図11】図11は、「撮像処理」に係わる処理シーケンスのフローチャート。
【符号の説明】
1…撮影光学手段、
2…撮像手段、
3…測光手段、
4…蓄積制御手段、
5…メモリ手段、
6…ぶれ検出手段、
7…ぶれ補正手段、
8…表示手段、
9…圧電センサ、
10…撮像装置（主要部）、
11…制御回路（CPU）、
12…CCD、
13…処理回路（AMP，A／D）、
14…RAM、
15…ズーム光学系、
16…AF光学系、
17…ズームモータ、
18…AFモータ、
19…LCD、
20…外部メモリ、
21，22…レリーズSW、
23，24…ズームSW、
25…メインSW、
30…測距手段。
S10…ぶれ処理（メインルーチン）、
S14…蓄積時間・連写回数設定（サブルーチン）、
S101…撮影処理（メインルーチン）、
S108…露出設定（サブルーチン）、
S83…f値よりぶれ防止秒時設定（サブルーチン）、
S114…撮像処理（サブルーチン）。

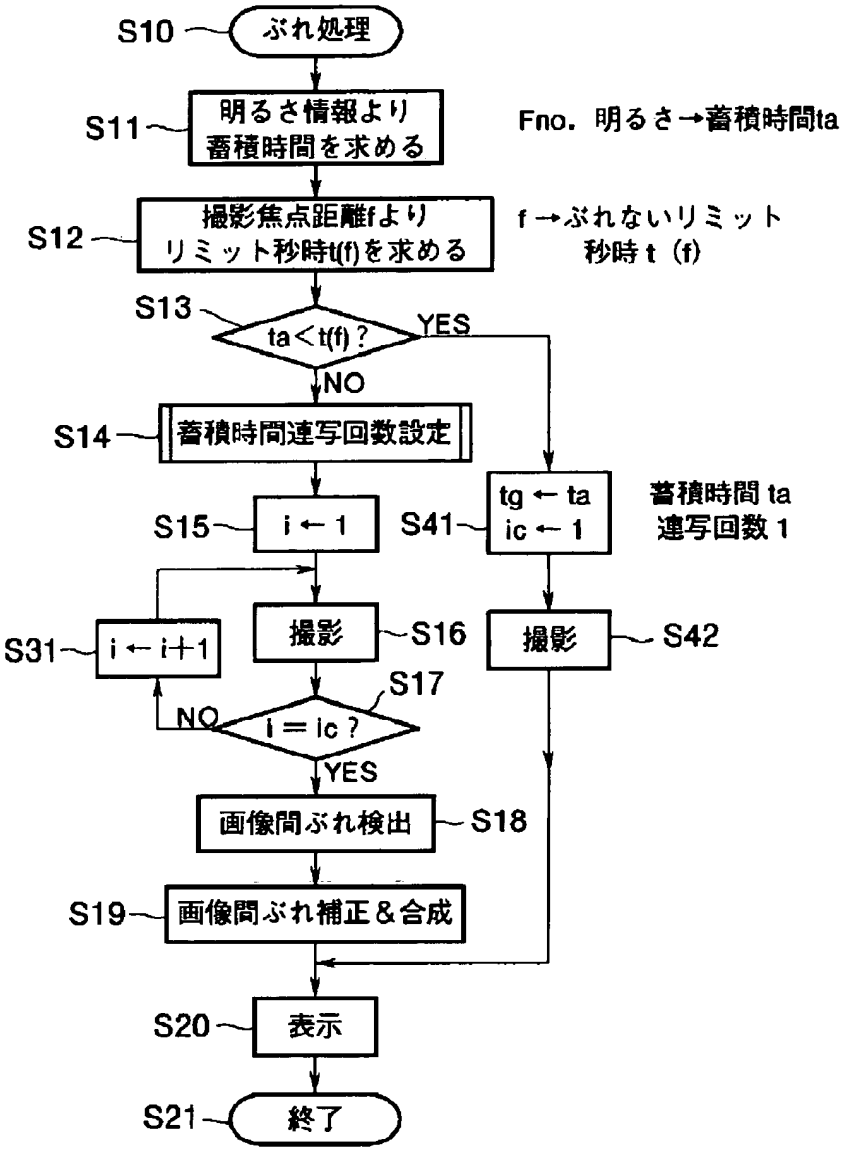
【図1】



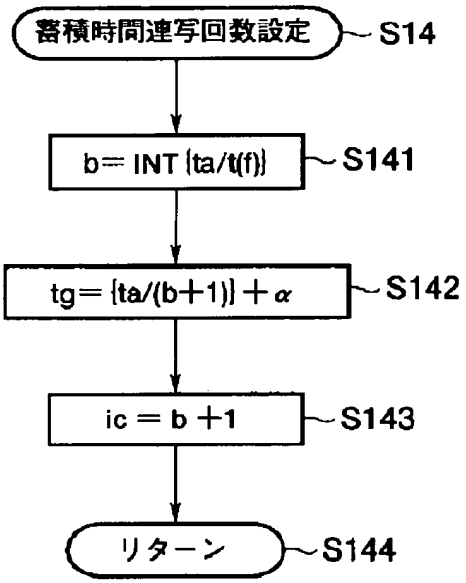
【図10】



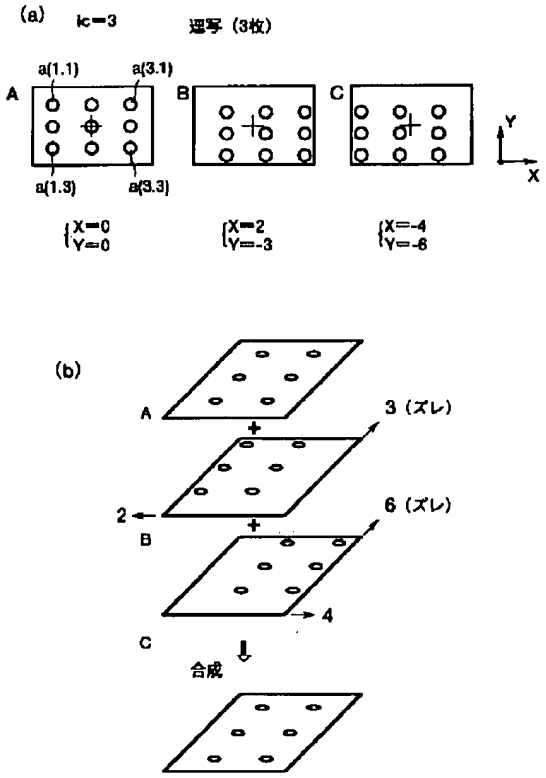
【図2】


S10
ぶれ処理
S11
明るさ情報より
蓄積時間を求める
Fno. 明るさ→蓄積時間ta
S12
撮影焦点距離fより
リミット秒時t(f)を求める
f →ぶれないリミット
秒時 t (f)
S13
ta＜t(f)？
YES
NO
S14
蓄積時間連写回数設定
S15
i ← 1
S41
tg ← ta
ic ← 1
蓄積時間 ta
連写回数 1
S31
i ← i+1
撮影
S16
撮影
S42
S17
NO
i ＝ ic ？
YES
画像間ぶれ検出
S18
S19
画像間ぶれ補正＆合成
S20
表示
S21
終了

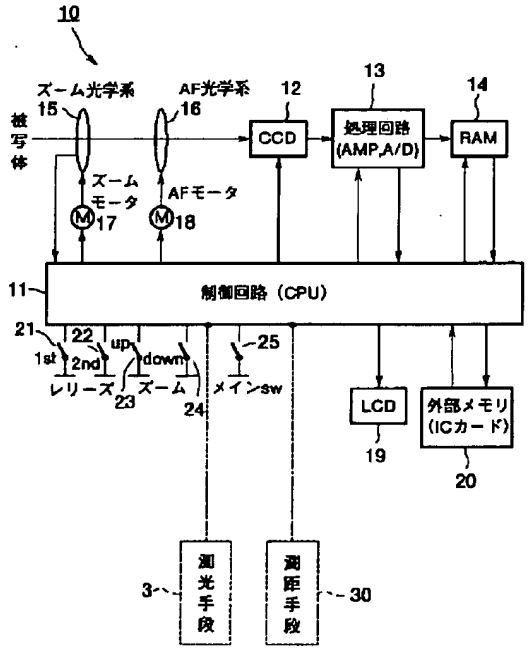
【図3】


蓄積時間連写回数設定
S14
b＝INT｛ta/t(f)｝
S141
tg＝｛ta/(b＋1)｝＋α
S142
ic＝b＋1
S143
リターン
S144

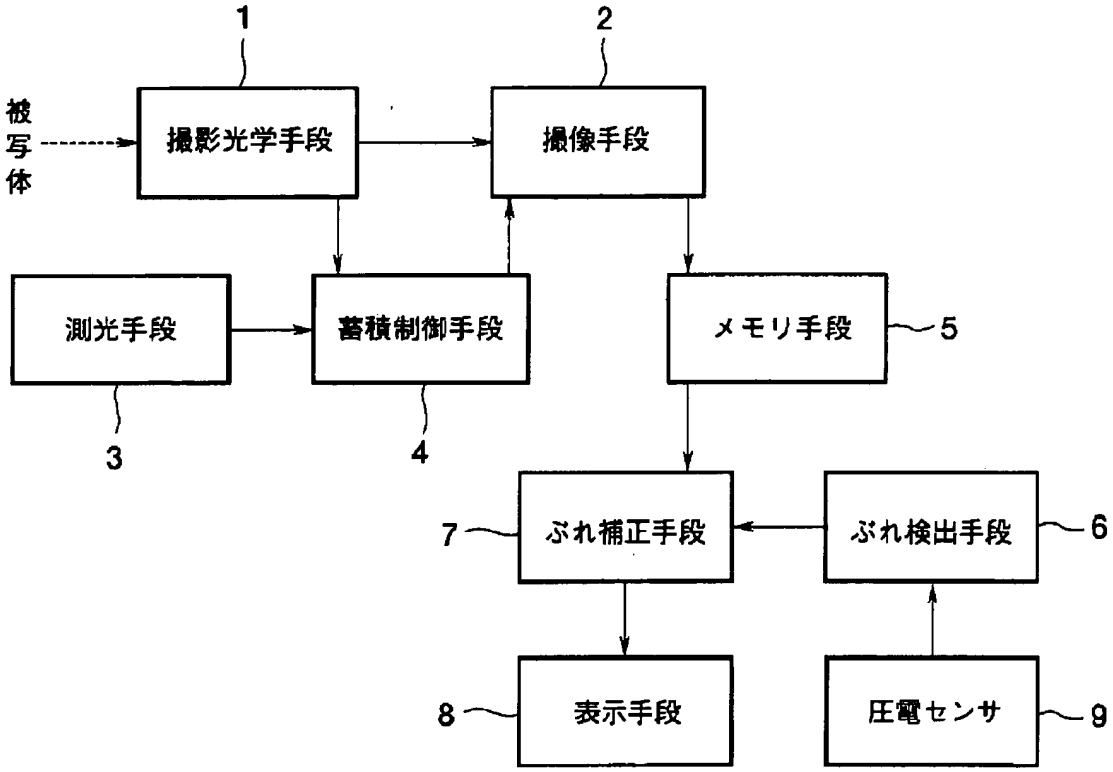
【図4】


(a)
ic=3
連写（3枚）
a(1.1)
a(3.1)
a(1.3)
a(3.3)
A
B
C
Y
X
X=0
Y=0
X=2
Y=-3
X=-4
Y=-6
(b)
A
3（ズレ）
2
B
6（ズレ）
4
C
合成

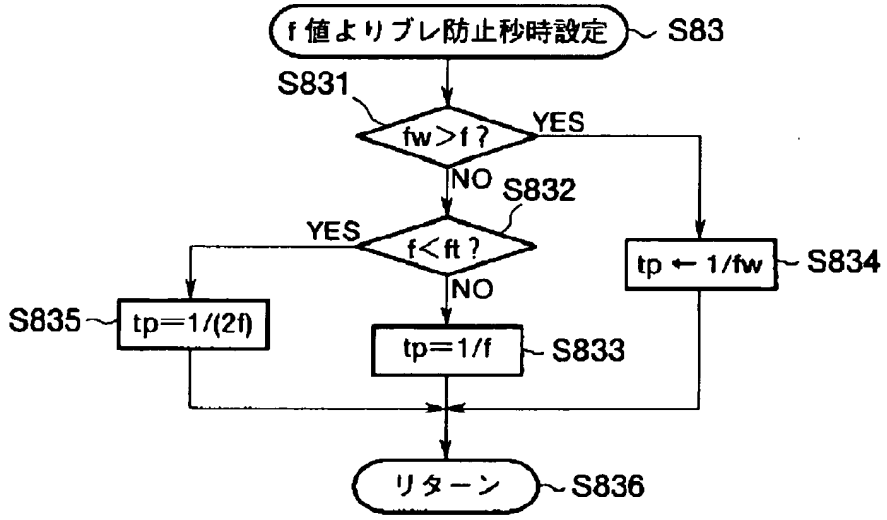
【図6】


10
ズーム光学系
15
AF光学系
16
被写体
CCD
12
処理回路
(AMP,A/D)
13
RAM
14
ズーム
モータ
17
AFモータ
18
制御回路（CPU）
11
21
1st
22
2nd
レリーズ
up
down
ズーム
23
24
25
メインsw
LCD
19
外部メモリ
(ICカード)
20
3
測光手段
測距手段
30

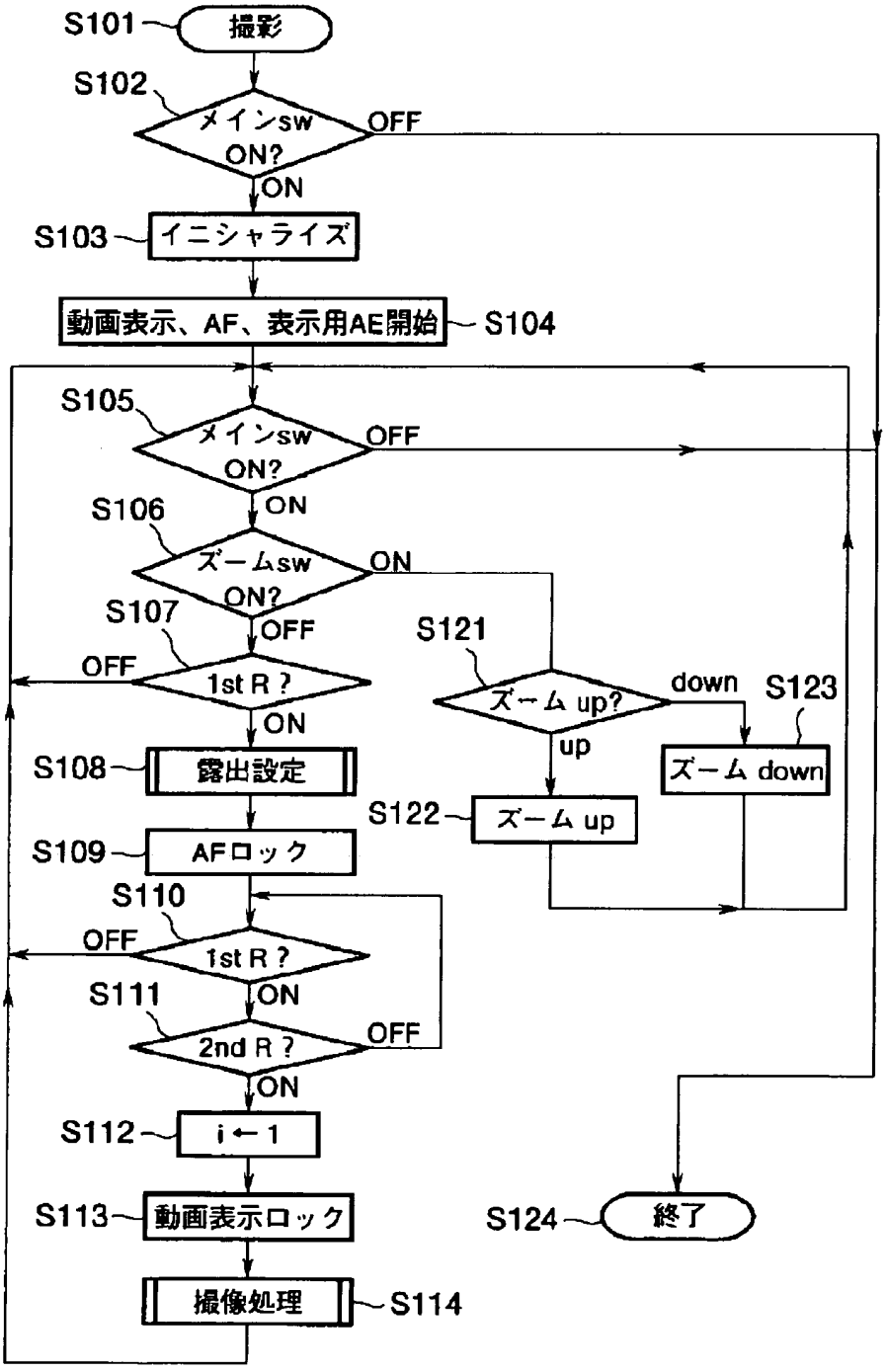
【図5】


1
2
被写体
撮影光学手段
撮像手段
測光手段
蓄積制御手段
メモリ手段
5
3
4
7
ぶれ補正手段
ぶれ検出手段
6
8
表示手段
圧電センサ
9

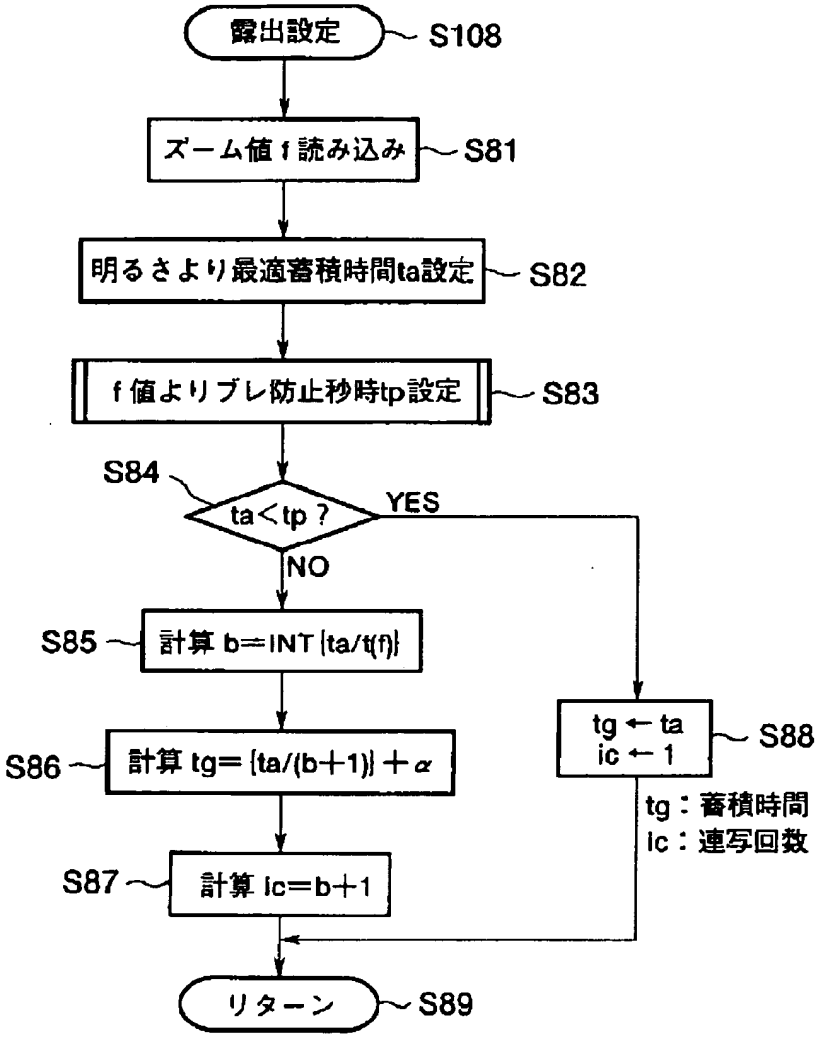
【図9】


f値よりブレ防止秒時設定
S83
S831
fw>f?
YES
NO
S832
YES
f<ft?
tp ← 1/fw
S834
NO
S835
tp=1/(2f)
tp=1/f
S833
リターン
S836

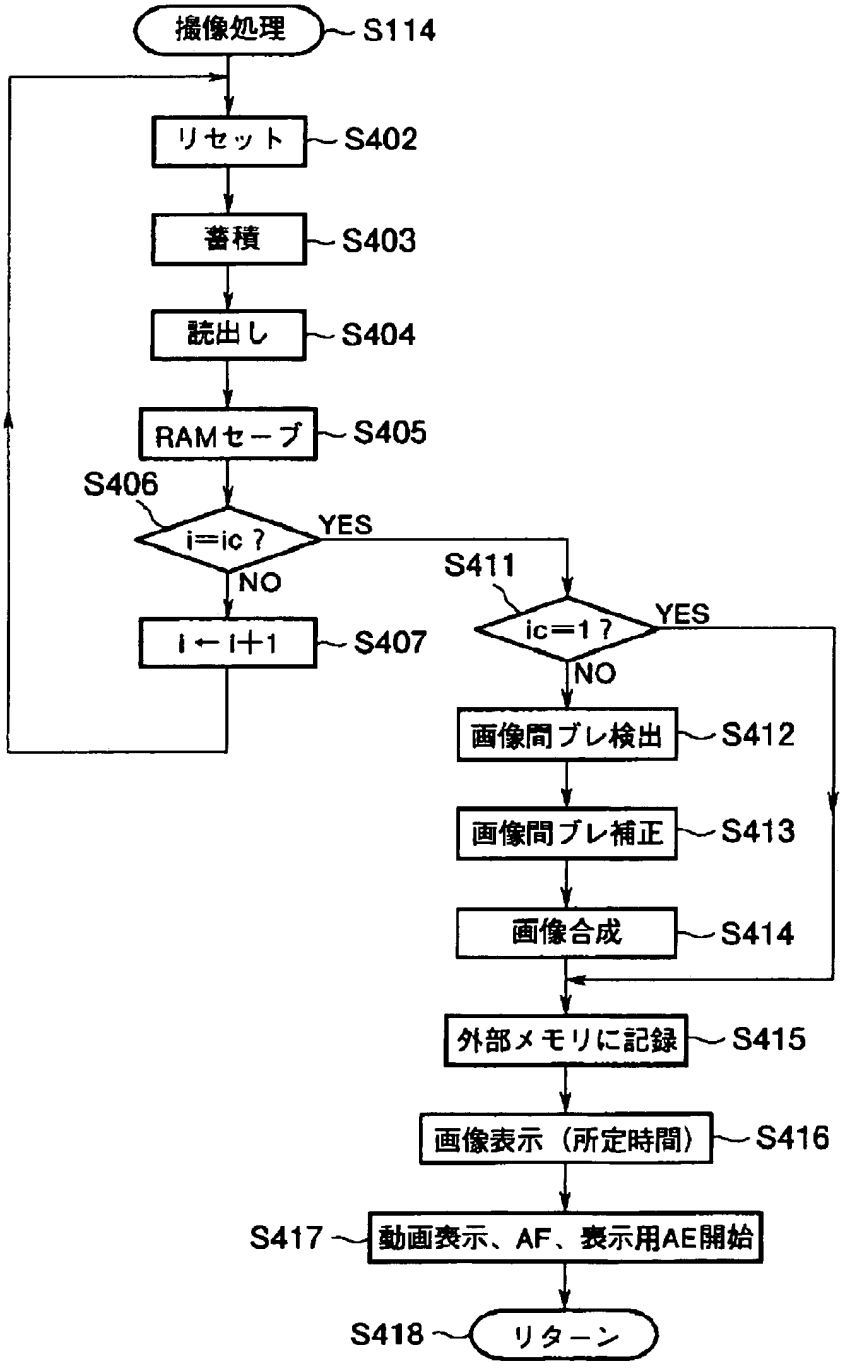
【図7】


S101
撮影
S102
メインsw ON?
OFF
ON
S103
イニシャライズ
動画表示、AF、表示用AE開始
S104
S105
メインsw ON?
OFF
ON
S106
ズームsw ON?
ON
OFF
S107
1st R ?
OFF
ON
S108
露出設定
S109
AFロック
S110
1st R ?
OFF
ON
S111
2nd R ?
OFF
ON
S112
i←1
S113
動画表示ロック
S114
撮像処理
S121
ズーム up?
down
up
S123
ズーム down
S122
ズーム up
S124
終了

【図8】


露出設定
S108
ズーム値 f 読み込み
S81
明るさより最適蓄積時間ta設定
S82
f 値よりブレ防止秒時tp設定
S83
S84
ta＜tp ?
YES
NO
S85
計算 b＝INT｛ta/t(f)｝
S86
計算 tg＝｛ta/(b＋1)｝＋α
S87
計算 ic＝b＋1
tg ← ta
ic ← 1
S88
tg：蓄積時間
ic：連写回数
リターン
S89

【図11】


撮像処理
S114
リセット
S402
蓄積
S403
読出し
S404
RAMセーブ
S405
S406
i=ic？
YES
NO
i←i+1
S407
S411
ic=1？
YES
NO
画像間ブレ検出
S412
画像間ブレ補正
S413
画像合成
S414
外部メモリに記録
S415
画像表示（所定時間）
S416
S417
動画表示、AF、表示用AE開始
S418
リターン

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] It is related with the blurring amendment technology of this equipment, concerning the image pick-up equipment which photos a still picture.
[0002]
[Description of the Prior Art] Since it can record especially electrically [an image] at an electronic camera also in the image pick-up equipment which photos a still picture, the various methods with which the blurring prevention method also differed from the film photo are proposed. For example, in JP,2-172366,A, two or more images are photoed continuously and the electronic "still" camera of the method which records only an image with little blurring is indicated.
[0003] Moreover, in JP,5-268523,A, the storage time of an image sensor is set up according to the amount of blurring, and the video camera of the method which amends the lack of the quantity of light by adjustment of gain is indicated.
[0004]
[Problem(s) to be Solved by the Invention] However, even if it photos the image of two or more sheets continuously with the electronic "still" camera of the method of JP,2-172366,A, also when only the images which blurring was not necessarily lost and missed the shutter chance when the storage time was long, or when a focal distance was long are also are recorded, it may happen.
[0005] Moreover, in the video camera of the method of JP,5-268523,A, even if it was going to set up the storage time according to blurring and was going to amend by gain, the image amended since the original S/N was bad also had the fault of becoming still more inferior.
[0006] Thus, the technical problem that above-mentioned fault must be conquered from the former occurs, and it looked forward to the image pick-up equipment which can obtain a good image. Then, the purpose of this invention is to offer the image pick-up equipment with which an image without blurring is obtained with an easy means, without reducing the image quality of a still picture.
[0007]
[Means for Solving the Problem] It is what image pick-up equipment of this invention is photoed on a multiple-times continuation target by the storage time which does not have blurring substantially, amends blurring for every photography, and "piles it up for" up in order to solve the above-mentioned technical problem and to attain the purpose, and image pick-up equipment which can obtain an image of suitable exposure without blurring is offered. Continuous shooting is carried out in detail by the exposure time which does not carry out blurring in low brightness conditions, and after amending a gap between two or more images, an image group of a underexposure is compounded. In order to attain this, image pick-up equipment of this invention is constituted as follows.
[0008] [1] The storage time of said are recording mold image sensor which blurring can disregard based on photography optical system which leads a photographic subject image on an are recording mold image sensor, and photographic subject brightness information and focal distance information on photography optical system at the time of photography, A control means which sets up a count of a

seriography for obtaining proper light exposure by photography of this storage time, Image pick-up equipment possessing a storage means to memorize two or more of these obtained image data, and an image composition means to compound in an image of proper exposure of one sheet after amending a mutual gap about image data memorized by said storage means is offered.

[0009] [2] The storage time of said are recording mold image sensor which blurring can disregard based on photography optical system which leads a photographic subject image on an are recording mold image sensor, and photographic subject brightness information and focal distance information on photography optical system at the time of photography, A control means which sets up a count of a seriography for obtaining proper light exposure by photography of this storage time, A blurring sensor which detects blurring information about blurring produced in the midst of this seriography, Based on a storage means to memorize two or more of these obtained image data, and image data memorized by said storage means and said blurring information, after amending a mutual image gap, image pick-up equipment possessing an image composition means to compound in an image of proper exposure of one sheet is offered.

[0010] [3] The storage time of said are recording mold image sensor which blurring can disregard based on photography optical system which leads a photographic subject image on an are recording mold image sensor, and photographic subject brightness information and focal distance information on photography optical system at the time of photography, A control means which sets up a count of a seriography for obtaining proper light exposure by photography of this storage time, Image pick-up equipment possessing a storage means to memorize two or more of these obtained image data, an image composition means to compound in an image of proper exposure of one sheet after amending a mutual image gap based on image data memorized by said storage means, and a display means to display this synthetic image is offered.

[0011]

[Embodiment of the Invention] The fundamental portion of this invention is shown below as 1st operation gestalt, and a still more concrete gestalt is shown as 2nd operation gestalt.

(The 1st operation gestalt) The block diagram shows the configuration rough about the image pick-up equipment of this invention to drawing 1 .

[0012] The method which detects "blurring between images" which is indicated by the conventional technology (for example, JP,1-109970,A) in two or more places of an image shall perform blurring detection of the image concerning this invention.

[0013] This image pick-up equipment is constituted by each following means so that it may illustrate. The photography optical means 1 which carries out image formation of the photographic subject to the image pick-up means 2, and an image pick-up means 2 to change this photographic subject into an electrical signal, The are recording control means 4 which sets up the signal storage time of the above-mentioned image pick-up means 2 from the brightness information on a photometry means 3 to measure the brightness of a photographic subject, and this photometry means 3, and the focal distance information on the photography optical means 1 and drawing information, A memory means 5 to record the electric image of the above-mentioned image pick-up means 2, and a blurring detection means 6 to detect blurring from two or more images with which continuous shooting of this memory means 5 was carried out, Image pick-up equipment mainly consists of a blurring amendment means 7 detected with this blurring detection means 6 to blur and to amend blurring based on information, and a display means 8 to display the amended image.

[0014] (The operation effect 1) In the above configurations, each means does the following operations so, respectively. The are recording control means 4 sets up the storage time of the optimal image pick-up means 2 for photoing the image with which it extracts as the focal distance information on the photography optical means 1, and multiple times do not blur based on information and brightness information, in order to obtain the image of the optimal exposure. This image pick-up means 2 photos multiple times in the set-up storage time, and carries out record maintenance of the image at the memory means 5.

[0015] The blurring detection means 6 detects blurring between the images of two or more images by

which record maintenance was carried out into the memory means 5. Moreover, the blurring amendment means 7 shifts and piles up the location of two or more images according to the blurring information on the blurring detection means 6, namely, carries out addition processing, and is compounded in the optimal image.

[0016] Therefore, the image of the correct exposure in which photography when the storage time is long does not have blurring, either can be offered. The flow chart shows the procedure concerning "blurring processing" to drawing 2 .

[0017] This routine was performed by the predetermined control means as a main routine of the blurring processing which is the feature of this invention, and has called the subroutine mentioned later. Initiation of this sequence sets up the storage time ta optimal for the image sensor used from "brightness information" and "drawing information" first (S10).

[0018] Little storage time t which blurs from "photography focal distance information" (f) It sets up (S12). The optimal storage time ta and the optimal storage time t (f) A size comparison is performed (S13). here -- ta<t (f) it is -- a case sets the count ic of photography as 1 while setting the actual storage time tg as ta (S14). Then, photography actuation is performed and it progresses to step S20 (S42).

[0019] on the other hand -- the above-mentioned step S13 -- ta<t (f) it is not -- a case performs a setup of the storage time tg and the count ic of a seriography by the call of a subroutine "a count setup of storage-time continuous shooting" (S14).

[0020] I is initialized to Variable i (S15). Then, photography actuation is performed (S16). The size judging of Variable i and the count ic of continuous shooting is performed (S17). When it is not i=ic, this variable i is counted up to i+1, and it still returns to step S16.

[0021] On the other hand, in i=ic, blurring (namely, blurring with a direction amount) between the photography images by which ic time "continuous shooting" was carried out is detected (S18). Blurring for every detected image is amended and it piles up (S19).

[0022] The obtained photography image is indicated by the output at a display means (S20). And a series of above sequences are ended (S21). Moreover, the subroutine concerning above-mentioned "above-mentioned storage time and count setup of continuous shooting" is shown in the flow chart of drawing 3 .

[0023] A call of this subroutine starts the following setting sequences (S14). ta/t (f) It carries out and the value which omitted below decimal point is set as Variable b (S(however, let Variable b be integer) 141).

[0024] {ta/(b+1)}+alpha is set as the actual storage time tg (S(however, short predetermined time amount, 0 [for example,], is sufficient as alpha) 142). b+1 is set as the count ic of continuous shooting (S(in addition by ic=1, continuous shooting is not performed) 143).

[0025] A return is carried out to the above-mentioned main routine from this sequence (S144). Here, the technique amended in a right image is explained based on two or more images which carried out continuous shooting.

[0026] One synthetic image compounded [was piled up and] and obtained in the continuous shooting image of three sheets of A-C by which blurring detection was carried out shown in drawing 4 (a) as shown in drawing 4 (b) is generated. In detail, as shown in drawing 4 (a), the consistency for between [every] images is judged at two or more blocking points of a screen, and the "amount of gaps" about X and the biaxial direction of Y is detected.

[0027] This amount of gaps "is shifted" in the direction which complements a gap for Image B and Image C on the basis of Image A by request. That is, the synthetic image which is made to carry out addition processing and is shown in drawing 4 (b) is obtained.

[0028] (Operation effect 1') As this above operation gestalt explained, even if it is the case where blurring occurs in the time of a long focus or a long second etc., without adding a new sensor, blurring for every [having obtained by performing a seriography by the storage time which does not have blurring substantially] photography image can be amended, and an image without blurring can be offered by carrying out synthetic processing.

[0029] Therefore, even if an image sensor does not perform blurring detection, the photometry sensor

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and AF sensor which were divided into plurality may be used, and an angular-velocity sensor, an angular-acceleration sensor, a speed sensor, or the so-called "blurring sensors", such as an acceleration sensor, may be used.

[0030] In the block diagram of drawing 5 shown below, the configuration at the time of using the angular-acceleration sensor (it being hereafter called a piezo-electric sensor for short) of a piezo-electric form for the image pick-up equipment of this invention is illustrated. The piezo-electric sensor 9 is added to each means shown in above-mentioned drawing 1 , and it consists of this example. That is, it blurs with the photography optical means 1, the image pick-up means 2, the photometry means 3, the are recording control means 4, and the memory means 5, and blurs with the detection means 6, and image pick-up equipment mainly consists of an amendment means 7, a display means 8, and this piezo-electric sensor 9.

[0031] However, the blurring detection means 6 detects blurring of an image not based on the information from the memory means 5 but based on the information from this piezo-electric sensor 9, and blurs based on this detected blurring information, and the amendment means 7 amends this.

[0032] Moreover, a photometry means may be performed using the signal of an image pick-up means. (Operation effect 1") Since the blurring amendment between direct images is attained from the blurring information from a sensor in blurring when a measurable sensor is used directly, the further high speed processing also becomes possible.

[0033] The image pick-up equipment which can offer the image of the correct exposure which improves by becoming possible to obtain two or more images which do not have blurring substantially by carrying out two or more continuous shooting until it becomes correct exposure by the storage time which does not blur substantially with this operation gestalt, and S/N of image quality amending blurring for every photography as mentioned above, and carrying out superposition processing, consequently does not have blurring is realizable.

[0034] (The 2nd operation gestalt) Then, as a matter of fact, an electronic camera is explained to an example about the time as 2nd [concerning this invention] operation gestalt. In addition, in this operation gestalt, the method detected by correlation between photography images performs blurring. Moreover, a photometry and ranging (it is hereafter called AF for short) also make serve a double purpose and use the image sensor.

[0035] The block diagram shown in drawing 6 has illustrated the configuration of the principal part of an electronic camera. Each following component is connected to CPU11 of the control circuit which controls an electronic camera in generalization. Namely, CCD12 as an image sensor which picturizes a photographic subject image and is changed into an electrical signal, The processing circuit 13 which performs predetermined amplification processing and A/D-conversion processing, and RAM14 which records the generated digital signal temporarily, The zoom optical system 15 for zooming, and the AF optical system 16 for automatic ranging, The zoom motor 17 which drives the above-mentioned zoom optical system, and the AF motor 18 which drives the above-mentioned AF optical system, LCD19 which carries out the display output of the obtained image, and the external memory 20 prepared in the CPU exterior of a control circuit, such as an IC card, The principal part of this electronic camera consists of release 21 and SW (namely, 1st, 2nd) 22, a zoom 23 and SW (namely, Up, Down) 24, and an actuation switch group of Maine SW25 grade.

[0036] (The operation effect 2) In the electronic camera of an above-mentioned configuration, the image which AF system etc. drove and was photoed by LCD19 by CCD12 by ON actuation of Maine SW25 by the user is optimized in a processing circuit, and it is displayed as an animation (for example, AGC (Auto Gain Control), storage-time control, etc.). By actuation of Release SW, still picture photography actuation is started, CPU11 sets up the storage time and the count of a seriography without blurring for a zoom value, "brightness information", and "drawing information", and photography is performed. The are recording storage of two or more photography images is once carried out at RAM14, and while CPU11 performs detection of the gap between those images, gap amendment, and composition of an image by the above-mentioned technique and carries out the display output of the image which was compounded and was obtained to LCD19, record-keeping of it is carried out to external memory 20.

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[0037] Therefore, even if it is photography of the long focus which is easy to blur, the image of the correct exposure in which photography when the storage time is long does not have blurring, either can be offered. In addition, the processing time can shorten further by using RISC (Reduced Instruction Set Computer) for CPU11.
[0038] The flow chart shows a series of processing sequences concerning "photography" to drawing 7 . This routine is the camera sequence of the electronic camera concerning this invention, and "blurring processing" which is the feature of this invention is performed by the below-mentioned subroutine called in this main routine.
[0039] A camera carries out the condition judging of Maine SW to initiation (S101) first with photography (S102). When Maine SW is OFF, in order to force this sequence to terminate, it branches to step S124 and this routine is ended.
[0040] On the other hand, when ON actuation of Maine SW is carried out, a series of following processing steps are performed. It initializes (S103). (for example, initialization of a lens location etc.)
[0041] While indicating the animation by LCD as a substitute of a finder, AF (for example, "Contrast AF" or "mountain-climbing AF" etc.) and the automatic exposure for a display (it is hereafter called AE for short) are started (S104).
[0042] The condition judging of Maine SW is performed again here (S105). Here, when Maine SW is OFF, in order to force this sequence to terminate, it branches to step S124 and this routine is ended.
[0043] On the other hand, when Maine SW is ON, Zoom SW (namely, Zoom up or a zoom (down)) is judged (S106, S121), and, in the case of Zoom up, the specified quantity drive of the zoom is carried out at a long focus side (S122). On the other hand, in the case of Zoom down, the specified quantity drive of the zoom is carried out at a short focus side (S123). And after drive termination returns to step S105.
[0044] In the above-mentioned step S106, when any zoom actuation is not carried out, the condition judging of 1st. release is performed (S107). When 1st. release is OFF, it returns to step S105 here.
[0045] On the other hand, when 1st. release is ON, the subroutine "an exposure setup" mentioned later is called and still picture photography exposure is set up (S108). And AF lock is performed (S109).
[0046] Again, the condition judging of 1st. release is performed (S111), and when 1st. release is OFF, it returns to step S1105. On the other hand, in the case of the 1st. release ON, the condition judging of 2nd. release is performed succeedingly (S111). When 2nd(s). release is OFF, it returns to step S110. On the other hand, when 2nd. release is ON, 1 is set as Variable i (S112).
[0047] The display of an animation is locked. That is, it continues (S113) displaying with the screen in front of photography of a screen. And it picturizes by calling the subroutine "image pick-up processing" mentioned later, and returns to step S105 (S114).
[0048] Moreover, a flow chart shows the processing sequence concerning the above-mentioned subroutine "an exposure setup" to drawing 8 . A call of this routine starts the sequence of this exposure setup (S108).
[0049] First, the current zoom value f is read (S81). The optimal storage time ta using lens information (for example, photography drawing information etc.) and brightness information is set up (S82).
[0050] From a focal distance f, tp is set up at the time of a blurring prevention second (S83). It blurs with the optimal storage time ta, and the size comparison with tp is performed at the time of a prevention second (S84). In ta≤tp, the actual storage time tg is set as ta, and the count ic of photography by continuous shooting is set up 1 (S88).
[0051] On the other hand, when it is not ta<tp, operation ta/tp is performed and the value which below decimal point omitted is set as Variable b (S(however, let Variable b be integer) 85). {ta/(b+1)}+alpha is set as the actual storage time tg (S(however, predetermined time amount [short] or 0 is sufficient as constant alpha) 86).
[0052] b+1 is set as the count ic of continuous shooting (S(however, it means in ic=1 that continuous shooting is not performed) 87). And a series of above processings are ended and a return is carried out to a main routine (S89).
[0053] Moreover, the processing sequence of "blurring from f value and setting up at the time of a prevention second" concerning a setup is shown in the flow chart of drawing 9 at the time of a second

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without the above-mentioned subroutine, i.e., blurring. It is called, and if the sequence of a setup is started at the time of a second without this blurring (S83), as follows, it will blur according to the value of a focal distance f, and tp will be set up at the time of a prevention second. In detail, first, the size comparison with fw and f is performed (S831), in fw>f, operation tp=1/fw is performed (S834), and it progresses and carries out a return to step S836. On the other hand, when it is not fw>f, the size comparison with ft and f is performed (S832), and in f>ft, it is operation tp=1/(two f). It carries out (S835).

[0054] On the other hand, in not being f>ft, it performs operation tp=1-/f (S833). And a return is carried out to the main routine which ended and called a series of processing steps (S836).

[0055] In addition, the value of each above-mentioned variable may be set up as follows.

fw : The predetermined value by the side of a short focus, for example, actual measurement f=60mmft,: the predetermined value of f= 150mm by the side of a long focus, for example, an actual measurement, -- again -- a long focus side -- predetermined time -- you may shift to the shorter one. For example, in f>ft, it is tp=1/(f+d). You may calculate. However, d is taken as a predetermined value.

[0056] Here, the graph shows the relation of the focal distances1/[f and] tp of a setup to drawing 10 at the time of the second not blurring. Even if the place of fw to a focal distance becomes short, by the short focus side, time amount tp becomes fixed, so that the orientation which this graph shows may also show.

[0057] Moreover, when it becomes longer than the long focus side ft at reverse, it turns out that time amount tp becomes still shorter. The above-mentioned subroutine "image pick-up processing" is illustrated by the flow chart shown in drawing 11 . If this routine is called, image pick-up processing will be started (S114), and signal reset of a sensor will be performed first (S402).

[0058] It accumulates (S403). (image pick-up namely, between the storage times tg) Read-out (AGC [as opposed to / Namely, / the are recording signal predicted] (Auto Gain Control) processing A/D conversion) of a signal is performed (S404).

[0059] Record maintenance of the digital signal is carried out at RAM (S405). The size judging with the count i of continuous shooting and the count ic of photography is performed (S406). When it is not i=ic, i+1 is set as i (namely, i one increment), and it returns to the above-mentioned step S402 (S407).

[0060] On the other hand, in i=ic, magnitude of the value of ic is judged continuously (S411). In the case of ic=1, it progresses to step S415. On the other hand, in not being ic=1, it performs the following processing step (S412-S414). That is, it asks for blurring between images from correlation between images (S412). (in addition, since these details are indicated by JP,1-109970,A, explanation is omitted)

[0061] Only the specified quantity shifts the gap for every image, for example on the basis of the image (namely, the first image A which carried out continuous shooting) of the 1st sheet (S413). Addition composition of the shifted image is carried out (S414).

[0062] It records on external memory (S415). Only predetermined time performs a display output for the photoed image (S416). As a substitute of a finder, it returns to the LCD display of an animation (S417).

[0063] And it ends and the return of a series of above processings is carried out to the called main routine (S418).

(Operation effect 2') As this operation gestalt explained, even when blurring, such as the time of a long focus or a long second, occurs according to above-mentioned technique, there is no blurring substantially, it is stabilized and two or more images with S/N good as much as possible can be obtained. Moreover, S/N of image quality improves further by amending blurring for every photography and carrying out superposition processing, and a display output can also do the image of correct exposure without this blurring on that spot.

[0064] (Modification 2) Even if an image sensor does not perform the still more nearly above-mentioned blurring detection, the photometry sensor and AF sensor which were divided into plurality may be used, and BURESENSA, such as angular velocity, angular acceleration, speed, and an acceleration sensor, may be used.

[0065] A photometry means may use the signal of an image pick-up means. AF may prepare the configuration of dedication. Moreover, saving of memory will be attained, if composition amends

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blurring at the time of read-out and addition processing is performed.
[0066] In addition, it is an operation gestalt with more suitable forming both the mode which amends blurring, and the mode which does not amend blurring in a camera. Because, since there is little blurring, a user good at photography is a reason which seldom carries out continuous shooting or does not have the necessity for continuous shooting.
[0067] Moreover, when blurring is measured by the measurable sensor on real time and blurring more than predetermined generates the actual storage time, photography is stopped and you may make it move to the next photography.
[0068] (Other modifications) Each means described in the specification may specifically have the following correspondence relation. For example, the photography optical means 1 corresponds to the zoom optical system 15, the AF optical system 16, or the ranging means 30. The image pick-up means 2 corresponds to CCD12. The photometry means 3 corresponds to AE device which is not illustrated. The are recording control means 4 corresponds to the control circuit 11 containing CPU. The memory means 5 corresponds to external memory 20 or RAM14. The blurring detection means 6 corresponds to an image sensor, a photometry sensor, AF sensor, or various kinds of speed sensors. The blurring amendment means 7 corresponds to programs, such as "blurring processing." The display means 8 corresponds to LCD19. In addition, deformation implementation various in the range which does not deviate from the summary of this invention is possible.
[0069] As mentioned above, although explained based on two or more operation gestalten, the following invention is included in this specification.
[1] The storage time of said are recording mold image sensor which blurring can disregard based on the photography optical system which leads a photographic subject image on an are recording mold image sensor, and photographic subject brightness information and the focal distance information on photography optical system at the time of photography, The control means which sets up the count of the seriography for obtaining proper light exposure by photography of this storage time, Image pick-up equipment characterized by providing a storage means to memorize said two or more obtained image data, and an image composition means to compound in the image of proper exposure of one sheet about the image data memorized by said storage means after amending a mutual gap.
[0070] [2] The storage time of said are recording mold image sensor which blurring can disregard based on the photography optical system which leads a photographic subject image on an are recording mold image sensor, and photographic subject brightness information and the focal distance information on photography optical system at the time of photography, The control means which sets up the count of the seriography for obtaining proper light exposure by photography of this storage time, The blurring sensor which detects the blurring information about blurring produced in the midst of said seriography, Image pick-up equipment characterized by providing an image composition means to compound in the image of proper exposure of one sheet after amending a mutual image gap, based on a storage means to memorize said two or more obtained image data, and the image data memorized by said storage means and said blurring information.
[0071] [3] The storage time of said are recording mold image sensor which blurring can disregard based on the photography optical system which leads a photographic subject image on an are recording mold image sensor, and photographic subject brightness information and the focal distance information on photography optical system at the time of photography, The control means which sets up the count of the seriography for obtaining proper light exposure by photography of this storage time, Image pick-up equipment characterized by providing a storage means to memorize said two or more obtained image data, an image composition means to compound in the image of proper exposure of one sheet based on the image data memorized by said storage means after amending a mutual image gap, and a display means to display said synthetic image.
[0072] (1) Image pick-up equipment characterized by providing the are recording control circuit which sets up the count of photography in which blurring of an image pick-up means to change an image into an electrical signal, and an image pick-up means carries out a seriography to little storage time, a detection means to detect blurring between the images by which the seriography was carried out, and an

amendment means to amend and pile up blurring between the images by which the seriography was carried out.
[0073] Operation 1: An image pick-up means changes an image into an electrical signal, an are recording control means takes a photograph by setting up the storage time whose blurring of an image pick-up means decreases, and the count of photography photoed continuously, and a blurring detection means detects blurring between the images photoed continuously. A blurring amendment means amends blurring between the images photoed continuously, performs superposition processing, and obtains the target image.
[0074] Effect 1: It is possible to obtain two or more images which do not have blurring substantially by carrying out two or more continuous shooting until it becomes correct exposure in the storage time not blurring, and S/N of image quality can offer the image of the correct exposure which improves by amending blurring for every photography and carrying out superposition processing, consequently does not have blurring.
[0075] (2) The photography optical system which carries out image formation of the photographic subject to an image pick-up means, and an image pick-up means to change an image into an electrical signal, A photometry means to compute the image storage time amount of the suitable image pick-up means for photography, and the focal distance information on photography optical system, It is based on the suitable storage time determined by said photometry means. The storage time of said image pick-up means at the time of photography, Image pick-up equipment characterized by providing the are recording control circuit which sets up the count which carries out a seriography, a detection means to detect blurring between the images by which the seriography was carried out, and an amendment means to amend and pile up blurring between the images by which the seriography was carried out.
[0076] Operation 2: A photography optical means carries out image formation of the photographic subject to an image pick-up means, and an image pick-up means changes an image into an electrical signal. A photometry means computes the image storage time amount of the suitable image pick-up means for photography, and an are recording control means sets up the image storage time amount of the image pick-up means of photography more nearly actual than the suitable are recording imaging time determined with the photography focal distance information and the photometry means of a photography optical means, and the count of photography photoed continuously, and carries out photography control. A blurring detection means detects blurring between the images photoed continuously, and a blurring amendment means amends blurring between the images photoed continuously, performs superposition processing, and obtains the target image.
[0077] Effect 2: The image of the correct exposure which there is no blurring substantially, can obtain two or more images with S/N good as much as possible, and whose S/N of image quality improves by amending blurring for every photography and carrying out superposition processing further, consequently does not have blurring can offer by carrying out two or more continuous shooting until it sets up the storage time not blurring from the time amount and the photography focal distance of correct exposure and it becomes correct exposure.
[0078] (3) The photography optical system which carries out image formation of the photographic subject to an image pick-up means, and an image pick-up means to change an image into an electrical signal, A memory means to memorize the photoed image data, and a photometry means to compute the image storage time amount of the suitable image pick-up means for photography, It is based on the focal distance information on photography optical system, and the suitable storage time determined by said photometry means. The storage time of said image pick-up means at the time of photography, Image pick-up equipment characterized by providing the are recording control circuit which sets up the count which carries out a seriography, a detection means to detect blurring between the images by which the seriography was carried out, an amendment means to amend and pile up blurring between the images by which the seriography was carried out, and an image display means to display the piled-up image.
[0079] Operation 3: A photography optical means carries out image formation of the photographic subject to an image pick-up means, an image pick-up means changes an image into an electrical signal, and a memory means records the photoed image temporarily. A photometry means computes the image

storage time amount of the suitable image pick-up means for photography, and an are recording control means sets up the image storage time amount of the image pick-up means of photography more nearly actual than the suitable are recording imaging time determined with the photography focal distance information and the photometry means of a photography optical means, and the count of photography photoed continuously, and carries out photography control. A blurring detection means detects blurring between the images photoed continuously, a blurring amendment means amends blurring between the images photoed continuously, superposition processing is performed, and an image display means carries out the display output of the image to have piled up according to the amount of amendments.
[0080] Effect 3: By setting up the storage time not blurring from the time amount and the photography focal distance of correct exposure, carrying out two or more continuous shooting until it becomes correct exposure, and accumulating in a memory means There is no blurring substantially, it is stabilized and two or more images with S/N good as much as possible can be obtained. Furthermore, S/N of image quality makes display offer of the image of the correct exposure which improves by amending ejection and blurring for every photography and carrying out superposition processing from the image recorded on the memory means, consequently does not have blurring on that spot.
[0081] (4) Said photometry means is image pick-up equipment given in (2) characterized by generating an output signal based on the output signal of said image pick-up means, or (3).
(5) Said blurring detection means is image pick-up equipment given in (1) characterized by detecting blurring based on correlation between the images which carried out the seriography, (2), (3), or (4).
[0082] (6) Said blurring detection means is image pick-up equipment given in (1) characterized by detecting blurring between images by the piezo-electric mold sensor, (2), (3), or (4).
(7) The image pick-up equipment which carries out [providing the exposure control means which sets up the count of a seriography determined according to the relation between photography optical system, an image pick-up means adjustable in the storage time, an operation means set up the proper storage time which gives proper exposure, the storage time that blurring at the time of photography can disregard, and its storage time and proper storage time, and an image composition means add after amending the gap between images by which the seriography was carried out, and] as the feature.
[0083] (8) The photography optical means to which image formation of the photographic subject is carried out, and an image pick-up means to change the image formation of the photographic subject concerned into an electrical signal, The are recording control means which sets up the signal storage time of said image pick-up means from the "brightness information" on a photometry means to measure the brightness of the photographic subject concerned, and said photometry means, the "focal distance information" on said photography optical means, and "drawing information", A memory means to record the electric image of said image pick-up means, and a blurring detection means to detect blurring from two or more images with which continuous shooting of said memory means was carried out, Image pick-up equipment characterized by providing a blurring amendment means to amend blurring based on the "blurring information" detected with said blurring detection means, and the display means which carries out the display output of the amended image.
[0084]
[Effect of the Invention] Thus, even if it does not add especially a new sensor according to this invention By performing a seriography by the storage time which does not have blurring substantially, amending blurring for every photography image, and carrying out synthetic processing by superposition further, even when it originates with an easy configuration at the time of a long focus or a long second etc. and blurring occurs Image pick-up equipments, such as an electronic camera with which the image which does not have blurring simply, without reducing the image quality of a still picture is obtained, can be offered.

[Translation done.]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] Image pick-up equipment characterized by providing the following Photography optical system which leads a photographic subject image on an are recording mold image sensor The storage time of said are recording mold image sensor which blurring can disregard based on photographic subject brightness information and focal distance information on photography optical system at the time of photography A control means which sets up a count of a seriography for obtaining proper light exposure by photography of this storage time A storage means to memorize said two or more obtained image data, and an image composition means to compound in an image of proper exposure of one sheet about image data memorized by said storage means after amending a mutual gap
[Claim 2] Image pick-up equipment characterized by providing the following Photography optical system which leads a photographic subject image on an are recording mold image sensor The storage time of said are recording mold image sensor which blurring can disregard based on photographic subject brightness information and focal distance information on photography optical system at the time of photography A control means which sets up a count of a seriography for obtaining proper light exposure by photography of this storage time An image composition means to compound in an image of proper exposure of one sheet based on a blurring sensor which detects blurring information about blurring produced in the midst of said seriography, a storage means to memorize said two or more obtained image data, and image data memorized by said storage means and said blurring information after amending a mutual image gap
[Claim 3] Image pick-up equipment characterized by providing the following Photography optical system which leads a photographic subject image on an are recording mold image sensor The storage time of said are recording mold image sensor which blurring can disregard based on photographic subject brightness information and focal distance information on photography optical system at the time of photography A control means which sets up a count of a seriography for obtaining proper light exposure by photography of this storage time A storage means to memorize said two or more obtained image data, an image composition means to compound in an image of proper exposure of one sheet based on image data memorized by said storage means after amending a mutual image gap, and a display means to display said synthetic image

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[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the Bure amendment method of the image which is applied to the Bure amendment method of the image used for image pick-up equipments, such as a video camera, especially can mitigate Bure of the image by shaking of a hand etc.
[0002]
[Description of the Prior Art] First, conventional image pick-up equipment is explained using drawing 6 . Drawing 6 is outline functional configuration block drawing of conventional image pick-up equipment. Conventional image pick-up equipment consists of an image pick-up means 1 and image output means 2'.
[0003] Next, each part of conventional image pick-up equipment is explained. The image pick-up means 1 is a means to change into an analog signal the image of light inputted through the lens by photo electric conversion. Image output means 2' amends the analog signal from the image pick-up means 1, performs and carries out analog output of the code translation etc., or analog-to-digital conversion of the analog signal from the image pick-up means 1 is carried out, and amends it, and performs and carries out the digital output of the code translation etc. In addition, since each of each functions is general technology, explanation is omitted.
[0004]
[Problem(s) to be Solved by the Invention] However, with the above-mentioned conventional image pick-up equipment, since the photographic subject was photoed having image pick-up equipment by hand generally, there was a trouble an image will not carry out [a trouble] the Bure ** as shaking of a hand etc. becomes a cause and it is shown in a1-a4 of drawing 7 that a smooth and good image was not acquired. Drawing 7 is explanatory drawing showing concretely Bure of the image in conventional image pick-up equipment.
[0005] In view of the above-mentioned actual condition, it succeeded in this invention, it amends Bure of the image by shaking of a hand etc., and it aims at offering the Bure amendment method of the image which can output a smooth and good image with little Bure.
[0006]
[Means for Solving the Problem] Invention according to claim 1 for solving a trouble of the above-mentioned conventional example A block which used an image in front of one as a reference image, is the same as a sample block which are said some of reference images, or was alike in a Bure amendment method of an image On a subject-copy image, are pinpointing within the limits near [said] the sample block location, search, and a movement vector and an inclination of said sample block are computed from said retrieval result. An amendment shaft used as an original medial axis of said subject-copy image is computed, an image range in alignment with said amendment shaft is computed, and it is characterized by using said image range as an output image, and Bure of an image can be amended if it is a motion of a range judged to be Bure.
[0007] In a Bure amendment method of an image according to claim 1, invention according to claim 2

for solving a trouble of the above-mentioned conventional example is characterized by a sample block being a block for a core of a reference image, computes an amendment shaft simply and can amend Bure.

[0008] Invention according to claim 3 for solving a trouble of the above-mentioned conventional example In a Bure amendment method of an image according to claim 1 a sample block A block for a core of a reference image, Are two or more blocks on a medial axis of said reference image, and compute a movement vector and an inclination of a sample block of said plurality, and each amendment shaft is searched for. A final amendment shaft is set as an average of said each shaft of amendment, and an image range in alignment with said final amendment shaft is computed, it is characterized by using said image range as an output image, and Bure of the whole image can be equalized and amended.

[0009]

[Embodiment of the Invention] The gestalt of the operation is explained about invention concerning a claim, referring to a drawing. The Bure amendment method of the image concerning this invention memorizes the image in front of one as a reference image. It searches for where the image range of the arbitration for a core of a reference image (sample block) is in an input image (subject-copy image). The amendment shaft used as the original medial axis of an input image can be computed from the migration direction (movement vector) and angle of rotation (inclination), the image range in alignment with the amendment shaft can be used as an output image, Bure of an image can be mitigated, and a smooth and good image can be acquired.

[0010] First, the configuration of the image pick-up equipment which realizes the Bure amendment method of the image concerning this invention is explained using drawing 1 . Drawing 1 is outline functional configuration block drawing of the image pick-up equipment concerning this invention. In addition, the same sign is attached and explained about the portion which takes the same configuration as drawing 6 .

[0011] The image pick-up equipment (this equipment) of this invention consists of an image pick-up means 1 and an image output means 2 as the same portion as conventional image pick-up equipment, and the image input means 3 and the Bure amendment means 4 are further established as a feature portion of this invention.

[0012] Next, each part of this equipment is explained concretely. The image pick-up means 1 is a means to change and output the image of light inputted through the lens as usual to an analog picture signal by photo electric conversion. The image input means 3 is a means to carry out the analog / digital conversion of the analog picture signal from the image pick-up means 1, and to output digital image data.

[0013] The Bure amendment means 4 memorizes the image outputted before one as a reference image, memorizes the digital image data from the image input means 3 as an input image (subject-copy image), amends Bure of an input image based on a reference image, and outputs the digital image data of the image after amendment. In addition, the concrete Bure amendment method is mentioned later.

[0014] After the image output means 2 carries out code translation of the digital image data of the image after the amendment from the Bure amendment means 4, and outputs a digital signal or it carries out a digital to analog, code translation of it is carried out and it outputs an analog signal.

[0015] Next, the 1st Bure amendment method of this invention is explained using drawing 2 and drawing 3 . Drawing 2 is explanatory drawing showing even the decision of the amendment shaft in the 1st Bure amendment method of this invention by the example, and drawing 3 is explanatory drawing showing even the extract of the image range in alignment with the amendment shaft in the 1st Bure amendment method of this invention by the example.

[0016] The 1st Bure amendment method of this invention uses the image before [one] being first shown in drawing 2 (a) as a reference image, prepares the medial axis (X-Y-axis shown by the dotted line) which crosses at the center of a reference image, and considers the block of the magnitude of the arbitration of the intersection portion of a medial axis as a sample block. And it searches for the same as that of a sample block, or the very alike block (approximation block) within limits which are near the sample block location on the input image shown in drawing 2 (b), i.e., the subject-copy image which

Bure has generated.
[0017] Here, within the limits which is near the sample block location is a range recognized not as the motion of image original but as Bure, and it is henceforth called a retrieval range. Moreover, as a medial axis, it may not limit to X-Y-axis which gave [above-mentioned] explanation, for example, you may be a polar coordinate etc.
[0018] Moreover, it is the block unit of the same magnitude as a sample block, and the retrieval method of an approximation block searches for a level and perpendicularly close block first, it rotates a block next about the closest block, and searches for a still closer angle. That is, the vector (movement vector) which shows the migration direction for Bure of a sample block by retrieval of this approximation block, and angle of rotation which shows an inclination can express.
[0019] And when Bure of a sample block is expressed with a movement vector and angle of rotation, it is the amendment shaft with which the medial axis of a reference image can be moved by the movement vector, the shaft made to rotate only angle of rotation can be searched for, and this shaft turns into an original medial axis of an input image. That is, the X'-Y' shaft shown in drawing 2 (b) as the continuous line is an amendment shaft.
[0020] Then, about the input image which Bure has generated, an image range (dotted line frame of drawing 3 (a)) where an amendment shaft (X'-Y' shaft) takes the lead in an image is computed, a pixel value is taken out from this image range in order along with a frame, and the output image after amendment (drawing 3 (b)) is created. Consequently, since the image after amendment becomes smaller than the image before amendment, photographic coverage is beforehand made slightly larger than an output image range.
[0021] In addition, by the 1st Bure amendment method of this invention, it is retrieval within the limits, and when an approximation block is not found in specific time amount, amendment is given up, and an output image range is taken out and outputted from an input image.
[0022] Next, the 1st above-mentioned Bure amendment method is concretely explained about how (the 2nd Bure amendment method) to raise amendment precision further using drawing 4 focusing on a different portion from the 1st Bure amendment method. Drawing 4 is explanatory drawing showing the outline of the 2nd Bure amendment method of this invention by the example.
[0023] The 2nd Bure amendment method of this invention is a method of establishing two or more sample blocks. That is, as shown in drawing 4 (a), the sample block of the number of arbitration is established as a sample block on a reference image on [other than the same sample block for a core as the 1st method] the X-axis or a Y-axis. And it searches for an approximation block about each sample block, and an average is taken about the amendment shaft (X'-Y' shaft) computed by each movement vector and angle of rotation, a final amendment shaft is determined, and the image range taken out using the amendment shaft is determined.
[0024] In addition, since the retrieval method of an approximation block etc. is completely the same as the 1st Bure amendment method, explanation is omitted. Moreover, although retrieval of an approximation block may follow all sample blocks, it can think how to equalize the amendment shaft of the sample block which succeeded in retrieval of an approximation block, and to determine a final amendment shaft in specific time amount in consideration of the processing time, and the method of equalizing each amendment shaft and determining a final amendment shaft if the sample block succeeded to retrieval of an approximation block becomes to the specific number. Moreover, it does not matter if at least one fails in retrieval, even if it will give up amendment about the sample block established beforehand.
[0025] Next, the Bure amendment method of this invention and especially the Bure amendment processing in which the 2nd Bure amendment method is realized are concretely explained using drawing 5 . Drawing 5 is flow chart drawing showing the flow of the Bure amendment processing in which the 2nd Bure amendment method of this invention is realized. In addition, drawing 5 shows the flow chart of the method of determining an amendment shaft in specific time amount from the sample block which succeeded in retrieval.
[0026] The 2nd Bure amendment processing of this invention inputs and memorizes a new input image

(100), a sample block is extracted from a reference image (110), and it searches for an approximation block within an input image (112), and judges whether retrieval was successful (114), and when unsuccessful, (No) flies to processing 118. Decision of a success here of retrieval is whether the close block existed in the degree beforehand defined in the time amount defined beforehand.
[0027] on the other hand, retrieval succeeded in processing 114 -- it is (Yes) -- the case where a movement vector and an angle of rotation are computed (116), an amendment shaft is computed and memorized (117), and it judges in time-out (118), and is not time-out -- (No) -- processing 110 -- returning -- the extract of the following sample block, and retrieval -- an amendment shaft is computed further. On the other hand, in processing 118, in the case of time-out (Yes), it judges whether retrieval was successful one or more than it (119), and when having not succeeded, (No) gives up amendment, and takes out and outputs an output image range from an input image (130), and the Bure amendment processing is ended.
[0028] On the other hand, in processing 119, when retrieval is successful one or more than it (Yes), an amendment shaft is determined (120), the image range to output is computed (122), the pixel value of the output image range for which it asked by count from the input image is taken out and outputted (124), and the Bure amendment processing is ended. In addition, when the sample block which succeeded in retrieval is plurality, the decision of the amendment shaft of processing 120 equalizes the amendment shaft searched for, respectively, and it opts for it.
[0029] Since it searches for whether the sample block on a reference image moved on an input image where and Bure of an image amends from the result by take out a pixel value from a center on the amendment shaft of indexing and input image image [shaft / of an input image / amendment] range according to the Bure amendment method of this invention , it is effective in the ability to be able to mitigate Bure by vibration of a hand etc. and able to acquire a smooth and good image .
[0030]
[Effect of the Invention] According to invention according to claim 1, about the sample block which are some reference images Since it is considering as the Bure amendment method of the image which uses as an output image the image range which computed the movement vector and the inclination by having searched for pinpointing within the limits near the sample block location on the subject-copy image, searched for the amendment shaft, and met the amendment shaft It is effective in the ability for Bure of an image to amend, consequently mitigate Bure by vibration of a hand etc., and acquire a smooth and good image.
[0031] Since it is considering as the Bure amendment method of the image according to claim 1 which considers a sample block as the block for a core of a reference image according to invention according to claim 2, Bure can be amended simply in quest of an amendment shaft, and it is effective in the ability to mitigate Bure by vibration of a hand etc. and acquire a smooth and good image.
[0032] According to invention according to claim 3, a sample block The block for a core of a reference image, Since it is considering as the Bure amendment method of the image according to claim 1 which uses as an output image the image range which searched for each amendment shaft as two or more blocks on a medial axis, and asked for the average of each amendment shaft as a final amendment shaft It is effective in the ability to equalize and amend Bure of the whole image, consequently mitigate Bure by vibration of a hand etc., and acquire a smooth and good image.

[Translation done.]